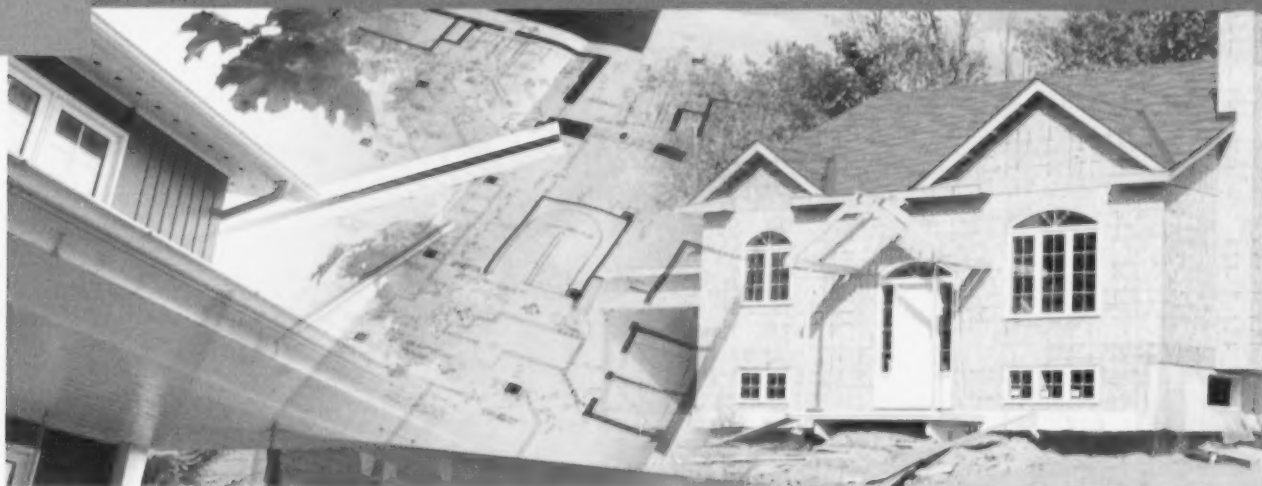


# CURRENT HOUSING RESEARCH

Social, Economic and Technical Research



Volume 19  
Number 1  
Spring 2012



## CMHC—HOME TO CANADIANS

Canada Mortgage and Housing Corporation (CMHC) has been Canada's national housing agency for more than 65 years.

Together with other housing stakeholders, we help ensure that the Canadian housing system remains one of the best in the world. We are committed to helping Canadians access a wide choice of quality, environmentally sustainable and affordable housing solutions that will continue to create vibrant and healthy communities and cities across the country.

For more information, visit our website at [www.cmhc.ca](http://www.cmhc.ca)

You can also reach us by phone at 1-800-668-2642 or by fax at 1-800-245-9274.

Outside Canada call 613-748-2003 or fax to 613-748-2016.

Canada Mortgage and Housing Corporation supports the Government of Canada policy on access to information for people with disabilities. If you wish to obtain this publication in alternative formats, call 1-800-668-2642.

# CURRENT HOUSING RESEARCH

Volume 19 no. 1  
Spring 2012

Issued also in French under the title: ***Recherches courantes sur l'habitation***

Publié aussi en français sous le titre: ***Recherches courantes sur l'habitation***



## INTRODUCTION

Under Part IX of the National Housing Act, the Government of Canada provides funds to Canada Mortgage and Housing Corporation to conduct research into the social, economic and technical aspects of housing and related fields.

*Current Housing Research* is compiled and produced one to two times a year by the Canadian Housing Information Centre. This publication provides information and access to research which is undertaken and sponsored by the Corporation. It is also available on CMHC's web site at [http://www.cmhc-schl.gc.ca/en/corp/li/horetore/horetore\\_004.cfm](http://www.cmhc-schl.gc.ca/en/corp/li/horetore/horetore_004.cfm)

The publication contains information on completed research reports, new publications, videos and bibliographies, as well as planned and ongoing research projects. An alphabetical title index of items listed is included at the end for quick reference.

The overall arrangement of "*Current Housing Research*" is by broad subject category. Within each subject category, lists of planned and ongoing projects and completed research reports are described.

Each entry can contain the following elements:

- The project or report title;
- A description of the project or report results;
- The CMHC Project Officer who is managing the project;
- The Division within CMHC which is responsible for the project;
- For External Research Projects, the grant recipient undertaking the research;
- A Contract Identification Number (CIDN);
  
- The Status of the project: whether the project is in a planned, ongoing or completed phase.  
"Planned Projects" are those that are not yet underway, but are likely to be initiated in the current year. "Ongoing Projects" refer to research projects which are currently underway. No reports are yet available. Once the project is completed, and a report is available for distribution, it will be listed as a "Completed Report."
  
- Whether the report resulting from the research project is available and the address where the completed report can be obtained.

To discuss research projects that are recent or ongoing, please call CMHC General Inquiries at (613) 748-2000 and ask for the CMHC Project Officer identified under each project description.

## ACQUIRING THE PUBLICATIONS AND REPORTS CITED AS COMPLETED

The availability section of each completed entry indicates the contact to obtain the item and whether the item can also be found on the Internet. Most items are available from the Canadian Housing Information Centre and can be ordered by using the information on the order form on the next page. We accept orders by regular mail, fax, phone, and via the Internet.

A number of the items cited are available electronically and the URL is included in the listing. CMHC uses an FTP (File Transfer Protocol) server to distribute reports. FTP has been used on the Internet as a means of transferring files between servers and users for many years and it continues to enjoy very wide use today.

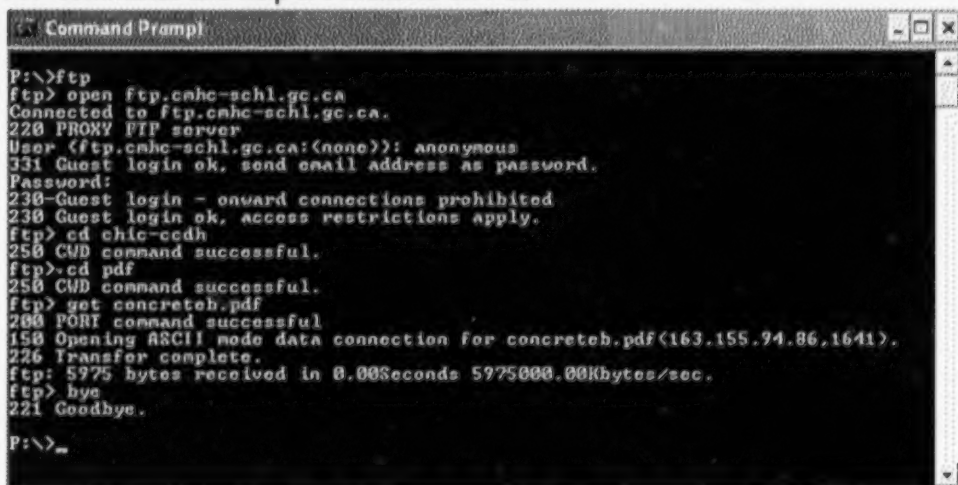
In order to access a file using FTP, software with FTP capabilities is required and there are 3 types of FTP software:

1. Command Line FTP - FTP commands can be entered from a Command line or "DOS Prompt" on all Windows PCs.
2. FTP Client - a purpose built application to connect to FTP servers. These are widely available as commercial products or as shareware or even freeware on the Internet.
3. Some (not all) web browsers - Internet Explorer and Netscape can be used to access FTP files. They use correct protocol when ftp:// is entered in the address bar of the browser.

Example: <ftp://ftp.cmhc-schl.gc.ca/>

Here is an example of using the command line to retrieve a file from FTP.

FTP commands and help are available on PCs



```
Command Prompt
P:\>ftp
ftp> open ftp.cmhc-schl.gc.ca
Connected to ftp.cmhc-schl.gc.ca.
220 PROXY FTP server
User (ftp.cmhc-schl.gc.ca:(none)): anonymous
331 Guest login ok, send email address as password.
Password:
230-Guest login - onward connections prohibited
230 Guest login ok, access restrictions apply.
ftp> cd chlc-cdh
250 CWD command successful.
ftp> cd pdf
250 CWD command successful.
ftp> get concreteh.pdf
200 PORT command successful
150 Opening ASCII mode data connection for concreteh.pdf(163.155.94.86,1641).
226 Transfer complete.
ftp: 5775 bytes received in 0.00Seconds 5775000.00Kbytes/sec.
ftp> bye
221 Goodbye.
P:\>
```

### CURRENT HOUSING RESEARCH ORDER FORM

If you wish to receive any of the completed reports or research highlights listed, or if you would like to be on the mailing list to receive *Current Housing Research*, please fill out this form and send it to:

Canadian Housing Information Centre  
Canada Mortgage and Housing Corporation  
700 Montreal Road  
Ottawa ON K1A 0P7  
Fax (613) 748-4069  
Telephone 1-800-668-2642  
Email: [chic@cmhc-schl.gc.ca](mailto:chic@cmhc-schl.gc.ca)

#### COMPLETED REPORTS REQUESTED



☐ Send copies of above reports, research highlights

☐ Add my name to your mailing list to receive *Current Housing Research*

Name		
Mailing Address (please include e-mail)		
City	Province	PostalCode

## CMHC'S EXTERNAL RESEARCH PROGRAM

For over 25 years, under the External Research Program, CMHC provided funding assistance to help Canadian researchers carry out research investigations on topics related to housing. The intent of the program was to encourage and draw out new ideas, innovative solutions, and better understanding of housing issues. Although new applications are no longer being accepted, ERP projects underway will be completed. CMHC may publish and disseminate the results through the Canadian Housing Information Centre.

Recipients of ERP grants were selected on the basis of the merit and significance of their proposals by a national committee of housing experts. Committee representatives included experienced researchers and practitioners in government, academic institutions and housing-related professions.

CMHC would like to take this opportunity to thank all of the applicants and winners over the years and congratulate them on their contributions to improving housing in Canada.

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ONGOING AND COMPLETED  
CURRENT HOUSING RESEARCH



## ABORIGINAL HOUSING

### ABORIGINAL OFF-RESERVE HOUSING TRENDS IN A SOCIO-ECONOMIC CONTEXT

The objective of this project is to develop an accurate, up-to-date picture of Aboriginal housing conditions for those not living on reserves, along with their mobility to reserves, with 10-year trending for important variables.

**CMHC Project Officer :** Candace Fedoruk

**CIDN :** 41030200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### CASE STUDIES OF THE CRITICAL PRECONDITIONS FOR ACHIEVING MARKET-BASED APPROACHES TO HOUSING IN FIRST NATION COMMUNITIES

This project consists of eight case studies of First Nation communities that have an established housing system with market characteristics. The studies will identify for each community the necessary and sufficient condition that enabled the market-like system to be implemented or to evolve. The findings from each community will be compared with each other to highlight commonalities and unique solutions and will also be discussed in the light of certain homeownership initiatives on tribal trust lands in the US.

**CMHC Project Officer :** Antoine Pomerleau

**CIDN :** 36800200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SMALL FOOTPRINTS ON UNBROKEN LAND / HEALING BROKEN LAND

The project will contribute professional advice and services towards a new First Nation development project located on wild unbroken land in coastal BC and / or on previously used industrial or agricultural broken land. Starting with planning workshops and the development of a community plan, then moving towards establishing a renewable energy platform based on a business plan that establishes a continuous revenue stream, a sustainable development strategy and design solution will be produced for housing construction under Section 95 funding and other recently announced programs to produce 150± homes over 5 years. This will be combined with infrastructure funding from Indian and Northern Affairs Canada, Western Economic Diversification Canada, Natural Resources Canada and Human Resources and Social Development Canada. This project will produce a practical demonstration of sustainable planning, design and development models for rural and remote communities elsewhere in Canada. Fully planned and developed communities, complete with renewable energy systems, road, water, waste water and other essential infrastructure, will occur in several First Nation locations. Development models will be produced that encourage incorporation of sustainability principles and that are built upon economic development and capacity building. The ultimate outcome is 100-150 new homes built by community members in a community planned by the community through workshops and design charrettes.

**CMHC Project Officer :** Allan Dobie

**CIDN :** 35290200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



## FLANKING SOUND TRANSMISSION IN WOOD FRAME MULTI-FAMILY DWELLINGS PHASE 3: CONSOLIDATION FOR ELECTRONIC DESIGN GUIDE

This project will consolidate the results of current and previous NRC-IRC flanking projects (Phases 2 - 4) and present them in the form of a best practice design guide that is easily accessible and useable by builders, architects, and engineers. This design guide will be the primary resource to aid in the design and construction of structures complying with possible future Canadian building-code mandated Apparent-STC and Apparent-ILC requirements, or other national model codes that use ISO metrics.

**CMHC Project Officer :** Charles Zaloum

**CIDN :** 39020900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## BASEMENTS, FOUNDATIONS & CRAWLSPACES

### BASEMENT WALL INSULATION RETROFIT MONITORING

There have been field observations and research findings in the last several years which suggest that polyethylene as a vapour barrier in many wall assemblies may be excessive, and that other vapour retarder systems may be preferable. The last CMHC research showed that the below-grade portion of interior insulated basement wall assemblies might benefit from more permeability, not less. Various interior insulated assemblies have been suggested as alternatives. This project is measuring the moisture performance of different basement interior insulation wall retrofit assemblies in 10 real houses to see if the research findings can be substantiated in the field, and to look out for unexpected repercussions in changing the current wall construction practice. Ten Saskatchewan basements have been retrofitted and are being monitored. This research is ongoing.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 36970200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### RETROFITTING CRAWL SPACES - FIRST NATIONS DEMONSTRATION

The project involved the retrofitting of several wet crawl spaces to solve the moisture problems. The retrofit work was documented and the crawl spaces are being monitored for a period afterwards to verify the effectiveness of the retrofit measures. The case studies will be used to demonstrate how to fix poorly performing crawl spaces. The project has been prepared in conjunction with First Nations housing authorities and responds to a pressing problem found on many reserves.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 33050200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## BUILDING MATERIALS

### COMPRESSED EARTHBLOCK (CEB) - STRAWBALE HYBRID BUILDING SYSTEM

This project will investigate the performance of straw bale insulation in combination with compressed earth blocks, as a hybrid building system. Earth blocks are found in many other parts of the world, but their use in Canadian buildings, so far, has been limited. The researcher will be monitoring energy use as well as some of the performance characteristics of the earth blocks. The project has been initiated. The earthblocks were cast and construction has been proceeding slowly. Because of the wet summer in 2008, 5% cement was added to the mixture for stabilization. Samples of the earthblocks will be tested at Queen's University for compression and bending, and the results compared to other CMHC earth block tests (Dupuy) and more standard construction material such as bricks and concrete masonry. The energy usage of the structure will be recorded to determine the envelope efficiency of the hybrid structure. Both moisture performance and the extent of cracking will also be monitored for one year after the completion of construction.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 36260216

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## CHILDREN'S ENVIRONMENTS

### HOUSING AFFORDABILITY AND THE WELL-BEING OF CHILDREN: TOWARDS A LONGITUDINAL RESEARCH STRATEGY

The primary purpose of this study was to develop and pilot a longitudinal research strategy that could be used to explore how affordable housing impacts children's development and well-being. Additional objectives of this study were to explore if there are differences between private rental housing, social housing and the Affordable Housing Program on the well-being of children and families.

The primary data collection strategy was a three-wave longitudinal study conducted on the same group of participants over a period of eight months. A baseline survey was completed with 65 adults (including 22 parents of children aged 6-15 years old) and 13 youth (16-21 year olds) who were either on the social housing wait-list and therefore in private rental housing; or those who had recently moved into either a social housing unit or an Affordable Housing Program subsidized unit (AHP). Qualitative in-depth interviews were also conducted with a small cohort of parents and youth participants to explore how the receipt of affordable housing might mediate other outcomes such as employment, education and health. Participants who were on the waiting list for subsidized housing described their experiences waiting for affordable housing.

Analyses of findings from the pilot data indicate that there are likely relationships between various indicators of children's well-being and parents' receipt of subsidized housing that could be uncovered through a longitudinal research project over a sufficient period of time. Children and youth living in unaffordable homes that were not subsidized may experience more negative outcomes than those living in subsidized housing. One of the key methodological lessons from the pilot was that developing and conducting a longitudinal research study needs to allow for a longer time frame as many households remain on the wait-list for a long time. Participants on the wait-list were still there by the third wave interviews. Considering that the waiting lists are not very dynamic, recruitment and sampling will need at least one-year.

*Prepared by: Uzo Anucha, Helen Leung, Alexander Lovell, the Applied Social Welfare Research and Evaluation Group, York University. CMHC Project Officer: Elizabeth Dandy. Ottawa: Canada Mortgage and Housing Corporation, 2011. (External Research Program Report) Main report (88 pages)+ Appendices (72 pages)*

## CHILDREN'S ENVIRONMENTS

Note: No. 11-012 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 67542)

**STATUS :** New Completed Report and Research Highlight

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Rsearch\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu%20al/Cal%20MH%2011H51\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Rsearch_Reports-Rapports_de_recherche/eng_unilingu%20al/Cal%20MH%2011H51_w.pdf) (main report) (1.31 MB)

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Rsearch\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu%20al/Cal%20MH%2011H51%20App\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Rsearch_Reports-Rapports_de_recherche/eng_unilingu%20al/Cal%20MH%2011H51%20App_w.pdf) (appendices) (668.20 KB)

### HOUSING, NEIGHBOURHOODS AND CANADIAN CHILDREN'S HEALTH OUTCOMES

This External Research Project will use Cycles 1 to 5 of the National Longitudinal Survey of Children and Youth (NLSCY) to examine whether and how much a family's housing choices (owned home, unassisted rental, assisted housing; single family, row housing, etc.) affect child health outcomes. The research will seek to identify which housing and neighbourhood characteristics associated with home ownership, rental, assisted housing and/or type of housing have impacts on health outcomes, and which do not, and how these characteristics interact with housing choices to affect child health outcomes.

**CMHC Project Officer :** Mark Holzman

**CIDN :** 36260205

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## CITY PLANNING AND HUMAN SETTLEMENTS

### COMPARING PREVIOUS TO CURRENT LOCATION: URBAN FORM, SELF-SELECTION BIAS AND TRAVEL PATTERNS

This study would shed light on the relative influence of self-selection bias vs. urban form and demographic variables on travel patterns (e.g. reducing car travel, enabling walking, transit-use and cycling and encouraging mode choice). Since urban form is an area that planners, municipalities and developers can affect, the findings would be of interest to them in helping them build neighbourhoods that maximize modal choice and help reduce car travel.

**CMHC Project Officer :** Susan Fisher

**CIDN :** 41850200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### PRACTICAL DESIGN GUIDE FOR URBAN HEAT ISLAND MITIGATION MEASURES

There is little or no mention of the issue of heat islands in development practices, community plans or planning regulations. The main objective is to develop a practical design guide to help municipalities manage and address heat island problems, by analyzing Montréal and Toronto.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 41330201

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## COOPERATIVE AND NON-PROFIT HOUSING

### GOVERNANCE CHALLENGES IN NON-PROFIT HOUSING ORGANIZATIONS

This project focuses on gaining a better understanding of the organizational and operational challenges facing board members and managers of non-profit housing organizations in Quebec. The research examines management strategies that the boards of directors and managers are adopting in the face of increasingly complex financial, maintenance, and support services arrangements. Further, the research looks at factors that motivate individuals to serve on the boards, and it examines the ways in which management succession affects the operation of the organizations.

**CMHC Project Officer :** Hoda Shawki

**CIDN :** 38840204

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UPDATING YOUR GUIDE TO RENTING A HOME AND GUIDE TO CO-OP HOUSING

This project will provide for updating of the substantive content of CMHC's online rental guide ("Your Guide to Renting a Home") annually, and of CMHC's online "Guide to Co-operative Housing" every second year; of the live links contained in these guides every four months, and of the non-link information contained in these guides annually. It will also provide for the handling of enquiries as received and the potential addition of new sections to the guides.

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 39660200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## DOORS AND WINDOWS

### CONTRIBUTION TO DEVELOPMENT OF A CONSUMER'S GUIDE FOR WINDOW AND DOOR REPLACEMENT

This project will contribute to a collaborative initiative with various industry stakeholders to develop a detailed illustrated consumer's guide showing and explaining how to remove existing and select and install new energy-efficient windows in residential buildings. An industry steering committee will guide this development process. The guidance material will show owners and contractors how to get the best energy performance for their window investment, and give them detailed 'how to' information to help them effectively install windows, flashings, air barriers, sealants and trims to reduce the risk of air and water leaks that might otherwise compromise the durability of the house. The project is expected to be complete by the winter of 2012.

**CMHC Project Officer :** Barry Craig

**CIDN :** 43220200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

### EVALUATING WALL-WINDOW INTERFACE DETAILS FOR RISK OF CONDENSATION ON BOX AND FLANGED WINDOWS

The development of alternative details to manage water intrusion at the wall-window interface has produced a number of novel approaches to detailing the interface between the window and adjacent wall assembly. Many of these approaches advocate the need to provide drainage at the rough opening of the window sub-sill given that the window components themselves are susceptible to water entry over their expected life. Depending on the types of windows used and the cladding into which the windows are installed, there arise different methods to provide drainage that may also affect air leakage through the assembly. This in turn may give rise to the formation of condensation along the window at the sill or along the window sash and glazing panels. Hence there is a need to determine if, under cold weather conditions, specific interface details that incorporate sill pans provide potential for condensation on the window components in which air leakage paths may be prominent at the sill or elsewhere on the window assembly. The report provides information on a laboratory evaluation of conditions that could result in the formation of condensation at the window frame perimeter of the interface assembly as a function of both temperature differential and air leakage rate across the test assembly. The laboratory test protocol is provided that includes a description of the test set-up and apparatus, fabrication details of the specimen and information on instrumentation and calibration. The experimental results for flanged and box windows are each discussed in turn. Included in the results is a preliminary analysis based on thermal simulation of the window frame in which experimental results are presented and compared to those obtained from simulation undertaken using a commercially available thermal software.

*Prepared by M. Armstrong ... et al., Institute for Research in Construction, National Research Council Canada. CMHC Project Officer: Silvio Plescia. Ottawa: Canada Mortgage and Housing Corporation, 2010. 207 pages (21.75 MB)*

**STATUS :** New Completed Report

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Rsearch/Reports-Rapports\\_de\\_recherche/eng\\_unilingu%20MH%2010E88\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/Rsearch/Reports-Rapports_de_recherche/eng_unilingu%20MH%2010E88_w.pdf)

### EXTERIOR WINDOW SHADING DEVICES FOR THE CANADIAN CLIMATE

This project will identify exterior window shading devices that can improve comfort and reduce household energy consumption in the Canadian climate. Existing technologies will be assessed for performance, durability, ease of integration with building envelope elements and user friendliness. The influence of freezing rain, wet snow, or melting/freezing snow on performance and operation will be assessed. Energy savings potential will be modelled to project savings potential for different Canadian climatic conditions, including the North.

**CMHC Project Officer :** Ken Ruest

**CIDN :** 38300200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



## ENERGY CONSERVATION

### DESIGN SURVEY OF LOW ENVIRONMENTAL IMPACT HOUSING

This research project documented case studies of low environmental impact housing (including net zero energy) in Canada and internationally in similar climates. The goal was to identify criteria and specifications for zero environmental impact housing in Canada, develop best practice models towards achieving this goal, and ultimately share information on these "deep green" housing models for Canadian climatic regions. Case studies were developed, analysed as a group and conclusions were provided.

**CMHC Project Officer :** Woytek Kujawski

**CIDN :** 25400200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### DEVELOPMENT OF AN ENERGY MANAGEMENT PILOT PROGRAM FOR SOCIAL HOUSING IN ONTARIO

CMHC is participating in the development of an Energy Management Program and pilot project for social housing. CMHC will be working with the Social Housing Services Corporation of Ontario to develop an Energy Management Program that will provide local social housing providers with the tools needed to evaluate and implement energy and water efficiency measures in their buildings. CMHC support will be used to develop or adopt tools for the Energy Management Program including utility tracking and on-line energy/water audit facilities, standard energy audits, and communication documents for property owners, managers and residents. CMHC will also participate in the evaluation of energy and water efficiency projects in 20 buildings selected to participate in a pilot project to evaluate the costs and benefits of the Energy Management Program. CMHC support will be useful to establish the Program in Ontario and will also provide other provinces with useful information on the development of central energy programs for their social housing stock as well.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 29820200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### ENERGY AND WATER EFFICIENCY RETROFITS FOR MULTI-UNIT RESIDENTIAL BUILDINGS

This project is updating the CMHC publication that provides building owners and managers of residential multi-unit residential buildings with information on cost-effective energy and water efficiency retrofits to reduce consumption, operating costs and environmental impacts of their buildings. New retrofit strategies will be added and obsolete measures will be removed. The cost-benefit information will also be updated. The work has been received and is under review by CMHC.

**CMHC Project Officer :** Remi Charron

**CIDN :** 38370200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## ENERGY CONSERVATION

### ENERGY BLOCKS: TOOLS FOR AFFORDABILITY THROUGH ENERGY, CARBON AND COST REDUCTIONS

Can Home Energy Ratings be synchronized with Community Energy Plans to develop energy descent profiles for existing residential neighbourhoods that reduce long-term energy costs? The objective of this research is to create an index tool that links existing databases to show the adaptive energy capacity of housing to achieve EQuilibrium™ housing standards and long-term affordability.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 41330207

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### ENERGY CONSERVATION IN CANADIAN BUILDINGS USING ADVANCED THERMAL INSULATION

The National Research Council of Canada, Institute for Research in Construction (NRC/IRC) received financial assistance from Canada Mortgage and Housing Corporation (CMHC) and the EcoEnergy Technology Initiative (EcoETI) for the purpose of conducting research on the application of advanced thermal insulation that not only offers higher thermal resistance but is also eco-friendly (i.e. renewable, energy efficient, biodegradable and indigenous). A cradle-to-grave analysis of thermal insulating materials in terms of energy consumption and impact on environment will also be undertaken to help in the selection of appropriate insulating materials. This study, currently in its third year of work, is carried out in four tasks over a three year period: Task 1 (Investigation on advanced thermal insulations) has been completed. Task 2 (Cradle-to-grave energy consumption analysis for thermal insulation materials) and Task 3 (Assess the thermal performance of building components constructed with advanced thermal insulation materials) and Task 4 (Demonstrate the impact of advanced thermal insulating materials on the potential energy conservation in Canadian buildings) are currently underway. The project is expected to be completed by summer of 2012.

**CMHC Project Officer :** Silvio Plescia

**CIDN :** 39720200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### ENERGY CONSUMPTION AND CONSERVATION IN MID- AND HIGH-RISE RESIDENTIAL BUILDINGS IN BRITISH COLUMBIA

This research study was undertaken to assess the impacts of building enclosure rehabilitations on the energy consumption of mid- to high-rise (5 to 33 storey) multi-unit residential buildings. The principal objectives of this study were to review and assess the actual energy consumption of in-service mid- to high-rise residential buildings, and the impacts of building enclosure rehabilitation related improvements on the overall energy consumption of these buildings. These findings were used to determine better building enclosure design strategies to reduce energy consumption and associated greenhouse gas emissions, while considering the other building functions for both new and existing buildings. The funding partners of this study included Canada Mortgage and Housing Corporation (CMHC), the Homeowner Protection Office (HPO), a branch of BC Housing, City of Vancouver, Terasen Gas, BC Hydro, FortisBC, and RDH Building Engineering Ltd. Additional support in development and calibration of the energy simulations was provided by Enersys Analytics Inc.

Warren Knowles directed and administered the project for RDH Building Engineering Ltd. CMHC Project Officer: Silvio Plescia. Ottawa: Canada Mortgage and Housing Corporation, 2012. 1 CD-ROM + Appendices.

## ENERGY CONSERVATION

Appendix A: Literature Survey of Energy Use In Mid- to High-Rise MURBs  
Appendix B: Building Energy Data Summary  
Appendix C: Thermal Calculations  
Appendix D: Pre-post Building Energy Data  
Appendix E: Pre and Post Rehabilitation Thermal Models  
Appendix F: Energy Modeling and Simulation Calculations  
Appendix G: Comparative Analysis of Six Buildings  
Appendix H: Conference Papers

**STATUS :** New Completed CD-ROM

**AVAILABILITY :** Canadian Housing Information Centre (CD-ROM) and  
[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu  
al/CA1%20MH%20I2E5I\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingu<br/>al/CA1%20MH%20I2E5I_w.pdf) (7.16 MB)

Note: Appendices available on a loan basis only

### ENERGY PERFORMANCE OF DIFFERENT ENERGY RETROFIT STRATEGIES FOR RESIDENTIAL WOOD-FRAME WALL SYSTEMS USING VIP - FEWF EVALUATION

CMHC in co-operation with National Resources Canada is providing financial assistance to the National Research Council to undertake a project that will assess the thermal performance of wall assemblies retrofitted from the exterior with a vacuum insulation panel (VIP) installed in the Field Exposure Wall Facility, and compare that performance with a wall assembly retrofitted with an exterior application of rigid foam board. Advanced modeling tools will be bench-marked against the experimental results. Parametric analysis will then be conducted to evaluate the potential performance of these highly insulated wall assemblies over the range of the Canadian climate zones Heating Degree Days (HDD). This project is currently in progress with completion expected by end of summer 2012.

**CMHC Project Officer :** Silvio Plescia

**CIDN :** 41140200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### EVALUATION OF THE IMPACT OF ENERGY EFFICIENCY AND SUSTAINABLE DEVELOPMENT MEASURES ON AFFORDABLE HOUSING

This External Research Program study analyzed the impact of energy efficiency and sustainable development (treatment of grey water, "green materials") measures on the operation of community housing buildings. The analysis deals with actual energy costs vs. projected costs, the costs of maintenance service and the effects on maintenance practices.

**CMHC Project Officer :** Woytek Kujawski

**CIDN :** 36260210

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



### LEAST COST ANALYSIS FOR CANADIAN NEW HOUSING

This External Research Program research project provided insight on what upgrades could be incorporated into new housing to improve energy efficiency without adding any extra net cost to the homeowner based on life cycle cost analysis. The study characterized the energy savings against the costs of the energy upgrades to determine at what point declining energy savings no longer support upgrade costs without representing an overall expenditure increase to the homeowner. The research was divided into two parts: 1) Simulation and analysis of energy efficient building upgrade potential for the Canadian residential sector using representative housing data and 2) Simulation and application of the lowest cost upgrade to the house to determine the overall cost with the upgrade(s) to meet the energy efficiency objectives. Final analysis was conducted and conclusions were provided. The Research Highlight publication is expected by the summer 2012.

**CMHC Project Officer :** Woytek Kujowski

**CIDN :** 40140202

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### PERFORMANCE ANALYSIS OF RESIDENTIAL HOT WATER EFFICIENCY DEVICES

This project will look at the energy savings (if any) that come from replacing conventional residential water heaters with tankless (or instantaneous) appliances. The project will assess domestic hot water energy consumption before and after the retrofits of tankless gas-fired water heaters in at least 50 houses so that savings can be compared. Water usage and homeowner satisfaction will also be surveyed. CMHC has engaged the support of two utilities in Ontario and Saskatchewan to help find test houses. Most of the Ontario houses have been obtained and work is continuing to find houses for the Saskatchewan component of the field testing. Monitoring results are expected through 2010 and 2011.

**CMHC Project Officer :** Remi Charron

**CIDN :** 38410200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### RESEARCH PROJECTS AT THE CANADIAN CENTRE FOR HOUSING TECHNOLOGY (CCHT)

This project provides funding for collaborative research at the Canadian Centre for Housing Technology (CCHT) for a portfolio of research projects initiated by three CCHT partners. These research projects will result in improved understanding of energy performance of building envelope changes to attic venting changes, provide understanding of energy benefits from ground source heat pump heating and air conditioning systems, and how solar technologies can be adapted to seasonal conditions. Knowledge to improve the in-situ performance of PV systems will also be created.

**CMHC Project Officer :** Ken Ruest

**CIDN :** 41980200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## ENERGY CONSERVATION

### SUPPORT FOR THE DEVELOPMENT OF A NEW CSA STANDARD ON FANS AND MOTORS

The Canadian Standards Association has formed a technical subcommittee on the performance of motor/fan combinations. To ensure that the subcommittee membership includes individuals with residential expertise, CMHC retained the services of a consultant to attend the CSA meetings and provide guidance on residential fan motor efficiency to the standards committee. Several meetings have been held and more will be scheduled prior to voting on the standard.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 37730200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### TESTING DIFFERENT APPROACHES TO ENERGY REDUCTION IN FIVE 1 1/2-STOREY POST-WAR HOUSES

This research report documents retrofits undertaken at 5 post-war homes in Windsor, Ontario, as well as the post-retrofit energy performance of 4 of the homes. The homes were retrofit with progressively more aggressive energy efficiency retrofits with the intent to assess which package of retrofits best met the needs of the housing provider with respect to costs, benefits and a variety of other indicators.

*Prepared by The Now House™ Project Inc. Now House Project™ Manager: Lorraine Gauthier. CMHC Project Officer: Remi Charron. Ottawa: Canada Mortgage and Housing Corporation, 2011. 23 pages (1.19 MB)*

Note: No. 11-102 in the Research Highlights Technical Series summarizes the results of this research and is available on the CMHC web site (Order number 67564)

**STATUS :** New Completed Report and Research Highlight

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu\\_al/CA1%20MH110%2011T22\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/h/Research_Reports-Rapports_de_recherche/eng_unilingu_al/CA1%20MH110%2011T22_w.pdf)

### THERMAL, ENERGY AND MOISTURE PERFORMANCE OF ALTERNATIVE (NON-WOODFRAME) HOUSING SYSTEMS

CMHC in partnership with Natural Resources Canada and the National Research Council undertook this project to characterize the thermal performance (and thermal mass potential) of the increasingly popular Insulated Concrete Form (ICF) housing system. This research project will be useful to evaluate and assess the contribution and impact of any thermal mass benefits embedded in the ICF system (i.e. the concrete) in comparison with the nominal RSI values which comprise the individual components of the system. Two ICF wall assemblies were constructed in the summer of 2009 and installed with sensors and monitoring equipment, into the Field Exposure of Walls (FEWF) test facility at the NRC. The ICF walls were exposed to real climate loads on the exterior and a conditioned environment on the interior for a period of 1 full year. The monitoring showed that the concrete moderated the heat flows to and from the interior providing a 5-day buffering effect. In general, the measured heat flux and temperature data from the field trial revealed that the concrete added very little to the overall R-value of the ICF under steady-state conditions. Some seasonal storage effects were also apparent. The project was completed. Final Report will be available in spring 2012.

**CMHC Project Officer :** Silvio Plescia

**CIDN :** 38350200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## FIRES & FIRE PREVENTION

### **SIMPLE DESIGN TOOLS FOR THE ASSESSMENT OF UPHOLSTERED FURNITURE BURNING IN HOME FIRES**

The life safety of occupants and fire fighters will be improved with a better understanding of the effects of upholstered furniture in living and sleeping areas when exposed to fire. This work demonstrates the time that elapses between the initiation of a major fire event and the time when conditions become untenable. The study acquires and analyzes data, then models and validates it for two houses furnished with typical upholstery. The research study is complete. The final report will provide designers with simple tools to evaluate the risk of fire involving different furniture on life safety.

**CMHC Project Officer :** Barry Craig

**CIDN :** 38840219

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## GREEN ROOFS

### **HEATING-SEASON ENERGY SAVINGS FROM EXTENSIVE GREEN ROOFS**

Green roofs are well known for their ability to cool buildings in the summer, reducing greenhouse gas emissions and energy costs for air conditioning. The benefits of green roofs for the thermal performance of buildings in winter are poorly understood. This research will incorporate data from experimental green roofs into building energy models to calculate expected energy savings during cold seasons for different types of housing.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 41330205

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HIGH-RISE AND MULTIPLE UNIT CONSTRUCTION

### **AIR LEAKAGE CONTROL IN MULTI-UNIT RESIDENTIAL BUILDINGS (MURBS) - DEVELOPMENT OF TESTING AND MEASUREMENT STRATEGIES TO QUANTIFY AIR LEAKAGE**

The testing, measurement and quantification of the airtightness performance or air-leakage characteristics of multi-family buildings has not evolved to the same extent that it has in the low-rise, single family home sector. Nevertheless, energy performance, indoor comfort, fire and life safety, amongst other criteria, depend on the airtightness characteristics of not only the envelope but also the unit compartments in multi-family buildings. The objectives of this project will include the updating and summation of the current knowledge related to testing methodologies and protocols for assessing and quantifying the airtightness of multi-family buildings, determining the existence of other international building air-tightness initiatives (whether they are programs or regulations) and evaluating their effectiveness; and to assess whether or not the various construction industry stakeholders, in those jurisdictions, have effectively responded to meeting the air-tightness requirements. This research will further our knowledge and understanding of airtightness testing and airtightness performance of multi-family buildings and will provide a foundation for advancing this area of study in the Canadian context. This project is expected to be completed by summer of 2012.

**CMHC Project Officer :** Silvio Plescia

**CIDN :** 39930200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HIGH-RISE AND MULTIPLE UNIT CONSTRUCTION

### DEVELOPMENT OF A POST OCCUPANCY EVALUATION PERFORMANCE ASSESSMENT FRAMEWORK FOR MURBS

This project will develop a CMHC framework for post occupancy evaluation (POE) of the performance of multi-unit residential buildings (MURBs), by enabling evaluation of the performance of MURBs in a systematic manner. The framework will support the development of a monitoring program for any future initiative for MURBs, and MURB projects such as the Tower Renewal project. Information provided by the POE framework will add to the body of knowledge that can support the adoption of innovations by the MURB sector and improve the performance of new and existing buildings.

**CMHC Project Officer :** Duncan Hill  
**Division :** Policy and Research Division  
**AVAILABILITY :** Product is not yet available

**CIDN :** 40730200  
**STATUS :** Ongoing

### ENGINEERED BUILDING ENVELOPE SYSTEMS FOR OUTDOOR/INDOOR CLIMATE EXTREMES

CMHC is contributing to a National Research Council project to identify indoor conditions and weather in northern and northern-coastal communities, and select appropriate building envelope assemblies for extreme climates. The project assesses the hygrothermal performance of these assemblies by computational and laboratory testing, measures air leakage by means of blower door tests and produces performance parameters for heating and high humidity climates. The project also analyzes the energy and environmental impact of proposed building envelope assemblies. The research findings will be published in a research report, and presented in seminars throughout Canada and the North.

**CMHC Project Officer :** Barry Craig  
**Division :** Policy and Research Division  
**AVAILABILITY :** Product is not yet available

**CIDN :** 29600200  
**STATUS :** Ongoing

## HOME OWNERSHIP

### ASSESSING THE OUTCOMES FOR HABITAT FOR HUMANITY HOME BUYERS IN CANADA

This project will analyze data from a survey to be conducted of Habitat families across Canada by CMHC with assistance from Habitat for Humanity Canada (HFHC). The survey will examine employment, financial, educational, and health outcomes for Habitat families after moving into their Habitat homes and the effectiveness of the Habitat Partner model in preparing Habitat families for homeownership.

**CMHC Project Officer :** Judith L. Binder  
**Division :** Policy and Research Division  
**AVAILABILITY :** Product is not yet available

**CIDN :** 43060200  
**STATUS :** Ongoing  
**\*NEW\***

## HOME OWNERSHIP

### COHORT PROGRESS TOWARD HOUSEHOLD FORMATION AND HOMEOWNERSHIP: A COMPARISON OF IMMIGRANT VISIBLE MINORITY GROUPS IN LOS ANGELES AND TORONTO

This External Research Program project will determine how robust the homeownership hierarchies of Canada and the United States are to different units of analysis.

**CMHC Project Officer :** Ian Melzer

**CIDN :** 41330202

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HOMELESSNESS

### NEXT STEPS: EVALUATING TRANSITIONAL HOUSING FOR THE HOMELESS

This External Research Program study seeks to provide information that can determine the role that transitional shelters can play in the continuum of responses to homelessness. The research will assess the effectiveness of the Next Steps Transitional Shelter program in Victoria, British Columbia; will analyze individual outcomes through a macro-policy lens focused on adequacy of income, housing availability, access to health services, and social inclusion and supports; and will review the effectiveness of integrating research with a service provider's intake and exit processes.

**CMHC Project Officer :** Hoda Shawki

**CIDN :** 40140213

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### ROLE OF PUBLIC HEALTH INSPECTORS IN MAINTAINING HOUSING IN NORTHERN AND RURAL COMMUNITIES

The purpose of this External Research Program study is to better understand the role of northern and rural public health inspectors in maintaining housing stock in accordance with health standards and how northern and rural housing challenges are addressed by public health inspectors.

**CMHC Project Officer :** Hoda Shawki

**CIDN :** 40140208

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### USING PHOTOVOICE TO EVALUATE THE IMPLEMENTATION OF SUPPORTIVE HOUSING IN OTTAWA

Photovoice is a participatory action research method that combines photography with other forms of qualitative data collected from interviews, focus groups, or writings. This External Research Program study will use photovoice in the evaluation of eight supportive housing agencies that form the Ottawa Supportive Housing Network (OSHN). The research will develop methods for evaluating the implementation of supportive housing by network members using photovoice, will use photovoice to evaluate the implementation of the participating programs, and will assess the value of photovoice as a program evaluation method.

**CMHC Project Officer :** Hoda Shawki

**CIDN :** 40140211

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



## HOUSE CONSTRUCTION

### DESIGN WIND LOADS FOR PHOTOVOLTAIC SYSTEMS ON SLOPED ROOFS OF RESIDENTIAL BUILDINGS

The objective of this study was to quantify the wind loads acting on a photovoltaic system mounted on the roof of a residential building. The photovoltaic system was modeled as an array on 1:20 scale building models, with roof slopes of 30° and 45°. Six different locations of the array and two spacing heights above the roof surface, 4 cm and 8 cm in full scale, were tested in the wind tunnel for 16 wind angles each. It was found that configurations with the array closest to the edge of the building produced the highest wind loads. The spacing height above the roof was not found to have a significant effect. The higher roof slope produced higher wind loads. An analysis was undertaken to determine if the installation of the solar array affected the wind loads acting on the roof structure. There was no significant effect found. The pressure coefficients recorded over a number of pressure taps were combined to evaluate a design pressure coefficient with respect to tributary areas. Design values, in a format to be used directly with the National Building Code of Canada were created for areas ranging from less than a square metre to 25m<sup>2</sup>.

*Prepared by: Sarah Stenabaugh, Panagiota Karava, Gregory A. Kopp, Boundary Layer Wind Tunnel Laboratory, Faculty of Engineering, University of Western Ontario. CMHC Project Officer: Silvio Plescia. Ottawa: Canada Mortgage and Housing Corporation, 2010. (External Research Program Report) 66 pages (3.05 MB)*

**STATUS :** New Completed Report

**AVAILABILITY :** Canadian Housing Information Centre and  
[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu al/Can1%20MH110%2010D28\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingu al/Can1%20MH110%2010D28_w.pdf)

### DURABLE WOOD-FRAME CONSTRUCTION FOR ALL CLIMATES

This document has been developed to provide designers and builders with the information they require to deal with the durability aspects of wood-frame buildings in any climate, ranging from very cold to hot and humid. It supplements "Canadian Wood-frame House Construction", CMHC's best-selling book on wood-frame residential construction in the Canadian climate.

The document is divided into four parts: Part 1 provides an introduction to the building envelope. Part 2 identifies the building science principles that contribute to a building's disability. Part 3 introduces definitions for various climates encountered around the world, the approaches for assessing various construction methods and materials and how well suited they are to particular climates. Part 4 applies the information described in Parts 1, 2 and 3 and gives examples of specific construction details that are well suited to climates ranging from very cold to hot and humid conditions. Appendices A and B provide additional supporting and reference information.

*Authors: Chris Mattock and Barry Craig. Ottawa: CMHC – SCHL International, Canada Mortgage and Housing Corporation, c2011. x, 221 pages*

*Nota: Disponible aussi en français sous le titre : Constructions à ossature de bois durables pour toutes les zones climatiques*

**STATUS :** New Completed Report (Order no. 67102)

**AVAILABILITY :** CMHC International and on a loan basis from the Canadian Housing Information Centre

### GLOSSARY OF HOUSING TERMS - UPDATE

This project reviews the current edition of "Glossary of Housing Terms" and conducts research to identify new terms and definitions which are missing. The "Glossary of Housing Terms" was last updated in 1995, resulting in the absence of a number of new housing terms, some of which are included in CMHC's new information products. All the existing terms and definitions have been reviewed to ensure they are still appropriate and that the definitions are accurate. Construction related acronyms and abbreviations, and terms common to multiple unit residential buildings have also been added. The revised "Glossary of Housing Terms" English manuscript should be complete by the end of 2012.

**CMHC Project Officer :** Barry Craig

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 33070200

**STATUS :** Ongoing

### IMPROVED PREDICTION OF SEISMIC RESISTANCE OF PART 9 HOUSES

Currently available approaches for the prediction of seismic resistance of conventional wood-frame construction (that is, buildings conforming to Part 9 of the National Building Code of Canada (NBCC)) are not able to predict the seismic resistance in a reliable manner. Experience in earthquakes and recent shake table tests of two-storey specimens have demonstrated generally good performance, but the limitations of this favourable behaviour are not well defined. A funding grant from the CMHC External Research Program has been provided to Forintek Canada Corporation (FP Innovations) to undertake a research project, to develop simple mechanics-based methods for the prediction of seismic resistance of conventional wood-frame ("Part 9") houses. Forintek investigated the adequacy of the bracing requirements for conventional wood-frame construction as outlined in the 2004 Canadian Wood Council Design Guide (CWC Guide) and the proposed Part 9 of the 2010 NBCC. The results showed an imbalance in the required lengths of braced walls in the short and long directions of rectangular buildings. In most studied cases, neither the 2004 CWC Guide nor the proposals for the Part 9 of the 2010 NBCC meet the seismic requirements of Part 4 of NBCC 2005 for high seismic zones. To address this imbalance between required lengths of braced walls in short and long directions of a rectangular building in conventional wood-frame construction, the researchers at FP Innovations proposed a new calculation method, based on the minimum length of braced wall as a function of the floor area of the building.

**CMHC Project Officer :** Silvio Plescia

**Division :** External Research Program

**AVAILABILITY :** Product is available

**CIDN :** 34380200

**STATUS :** Ongoing

### SEISMIC ISOLATION OF RESIDENTIAL WOOD FRAME AND LOW-RISE MASONRY BUILDINGS

The objective of this research was to evaluate the response of base isolated residential wood-frame and masonry buildings using Stable Unbonded Fiber Reinforced Elastomeric Isolator (SU-FREI) bearings in several seismic regions in Canada. Two model-scale bearing types were fabricated and tested to obtain mechanical properties and ultimate deformation limits. A shake table test of a scaled model two-storey base isolated building was conducted to investigate its response behaviour. The primary test output was the acceleration and drift experienced by the building and the lateral deformation in the SU-FREI bearings. A one-degree of freedom (1-DOF) nonlinear modelling approach, using the response spectrum technique, was developed to permit the rapid prediction of the peak response acceleration of an isolated building. Isolation systems were designed for both a

## HOUSE CONSTRUCTION

two-storey masonry building and a single storey wood frame building. Peak response acceleration and base shear force were predicted for both buildings. The level of seismic mitigation was evaluated using a comparative assessment of linear elastic non-isolated masonry and wood frame buildings. Results from this study show that a substantial reduction in the peak response acceleration and peak base shear can be achieved in both low-rise masonry and wood frame buildings by implementing SU-FREI base isolation systems.

*Team members: M.J. Tait, R.G. Drysdale, H. Toopchi-Nezhad, B. Foster and M.G.P. de Raaf. Principal Investigator: M.J. Tait, McMaster University. CMHC Project Officer: Silvio Plescia. Ottawa: Canada Mortgage and Housing Corporation, 2011. (External Research Program Report) 55 pages (1.71 MB)*

**STATUS :** New Completed Report

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu  
al/Can%20MHI10%20IS23\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingu<br/>al/Can%20MHI10%20IS23_w.pdf)

## SUSTAINABLE BUILDING SCIENCE BEST PRACTICES

The objective of this project is to consolidate energy-efficient and sustainable building science best practices into one comprehensive illustrated source that will serve as a text book and training manual for building science courses. It may be used in architectural programs at colleges and universities, and by builders and designers. The result of this research will be a common reference that describes sustainable building science for Canadian construction which is based on rigorous scientific research and testing, and energy conservation measures and that demonstrates best practices. It will be tailored to existing teaching curricula and it will be extremely useful to architects, engineers and building scientists resulting in an accurate and common understanding of sustainable building science principles and their interrelationship. The project is expected to be complete by the winter of 2012.

**CMHC Project Officer :** Barry Craig

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 35610200

**STATUS :** Ongoing

## UPDATE AND ENHANCE CANADIAN WOOD FRAME HOUSE CONSTRUCTION

This project will update and enhance CMHC's best selling publication "Canadian Wood-Frame House Construction" and advance the knowledge of students, builders, building inspectors and home owners regarding how to build wood-frame houses that are more sustainable, energy efficient, durable, and building code compliant. The enhanced publication will also support CMHC's efforts to position Canada's housing as among the best in the world. The project is expected to be completed by the winter of 2012 and published by the summer of 2013.

**CMHC Project Officer :** Barry Craig

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 40680200

**STATUS :** Ongoing



## HOUSE CONSTRUCTION INDUSTRY

### MEASURING THE EMPLOYMENT EFFECTS OF RESIDENTIAL CONSTRUCTION AND RENOVATION

The project will build upon earlier research and enhance CMHC's and the housing industry's understandings of the magnitude of the contribution that the residential construction sector makes to employment in the Canadian economy.

**CMHC Project Officer :** Michel Laurence

**CIDN :** 39861000

**Division :** Market Analysis Centre

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HOUSING AFFORDABILITY

### ACTION RESEARCH ON TRANSPORTATION AND HOUSING AFFORDABILITY

The question driving this External Research Program project is what is the potential for increasing housing choice and affordability in large Canadian cities through the application of sustainable transportation policy? The main goal of the research is to identify municipal transportation policies with the potential for the most positive impact on housing choice and affordability.

**CMHC Project Officer :** Meg Ogden

**CIDN :** 38840209

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### STATE OF MUNICIPAL HOUSING ACTIVITY IN METRO VANCOUVER: AFFORDABILITY AND DIVERSITY

This research will answer the question: To what extent are municipalities in Metro Vancouver taking steps to address housing affordability and diversity in their communities? This External Research Program project will document the extent to which municipalities in Metro Vancouver are adopting and implementing measures laid out in the Metro Vancouver Affordable Housing Strategy (2007) to address issues of housing affordability and diversity. It will also create a resource that can be used by Metro Vancouver municipalities and others to learn what actions municipalities have taken to promote housing affordability and diversity.

**CMHC Project Officer :** Ian Melzer

**CIDN :** 41330203

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HOUSING AND IMMIGRATION

### GHANAIAN AND SOMALI IMMIGRANTS IN TORONTO'S RENTAL MARKET: A COMPARATIVE CULTURAL OVERVIEW OF HOUSING PROBLEMS AND COPING STRATEGIES

This External Research Program study seeks to identify the housing challenges faced, and the coping strategies used, by Ghanaians and Somalis in the Toronto rental market, and how these are influenced by the cultural and the institutional context.

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 41330206

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UPDATING AND EXPANDING THE NUMBER OF MUNICIPALITIES IN THE SETTLING IN CANADA MINI WEBSITE

This study is aimed at improving and expanding the "Settling-in-Canada" tool on CMHC's web site which provides information to newcomers, both in Canada or abroad, on alternative settlement communities beyond the three largest CMAs in Canada.

**CMHC Project Officer :** Judith L. Binder

**CIDN :** 41620200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HOUSING EXPORT OPPORTUNITIES

### GUIDE FOR CANADIAN EXPORTERS ON THE FINANCING OF RUSSIAN HOUSING DEVELOPMENTS

This study will focus on the financial mechanisms that Canadian exporters and developers should investigate as part of their evaluation of business opportunities in Russia, whether these are exporting, joint ventures, equity positions or other opportunities. This study will investigate the current situation with respect to financing for the construction sector in Russia as well as describe the financing models offered by various financial institutions active in Russia. The study will clarify the following important financial mechanisms for construction for Canadian companies:

- The overall role of financing in the house/sub-division construction cycle in Russia, financing demonstration homes, land allocation for housing, development bonds, and Russian partnerships in sub-division development;
- The role of Canadian financial institutions (including Export Development Canada) in providing financing/insurance support for Canadian housing exporters.

**CMHC Project Officer :** Nina Romas

**CIDN :** 43530900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

## HOUSING EXPORT OPPORTUNITIES

### HEATING, VENTILATION, AIR CONDITIONING DISTRIBUTION SURVEY

This project seeks to improve the Canadian HVAC industry's understanding of the technical, regulatory and commercial challenges to U.K. market penetration and expansion. It will endeavour to increase the number of HVAC manufacturers with U.K. And/or EU regulatory approvals, which will lead to increased sales of Canadian HVAC equipment in the European market.

**CMHC Project Officer :** Roy Palaco

**CIDN :** 43140900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

### MARKET RESEARCH ON THE USE OF SOCIAL MEDIA AND NEEDS AMONG HOUSING EXPORT CLIENTS

The purpose of this project is to document the current use and potential for social media among housing export companies.

**CMHC Project Officer :** Nathalie Galaftion

**CIDN :** 43100900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

### RESEARCH ON HIGH-PERFORMANCE HRVS FOR COLD CLIMATES IN ALASKA AND RUSSIA

This project will produce technical performance data for market-ready high-performance Heat Recovery Ventilators/Energy Recovery Ventilators which can be used to market and promote this technology in Alaska and Russia in order to increase export opportunities. Monitored field data will be consolidated into a technical report and will be used to demonstrate the long-term performance of the products in harsh conditions. The data will also allow engineers to specify these products for demanding climates.

**CMHC Project Officer :** Charles Zaloum

**CIDN :** 43180900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

### RESEARCH ON THE EXPORT POTENTIAL FOR CANADIAN GREEN BUILDING PRODUCTS IN SIX CARIBBEAN AND CENTRAL AMERICAN COUNTRIES

The purpose of this project is to research the export potential for Canadian green building products in six Caribbean and Central American countries.

**CMHC Project Officer :** Brian Eames

**CIDN :** 39950900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

## HOUSING EXPORT OPPORTUNITIES

### RESEARCH STUDY ON THE TRINIDAD AND TOBAGO MARKET FOR CANADIAN BUILDING PRODUCTS

The purpose of this project is to research the market potential for Canadian building products in Trinidad and Tobago. The research will provide: 1) assessment of the trends and outlook for the housing market; 2) opportunities for Canadian manufacturers in light of existing duties and tariffs; 3) assessment of the green build environment; and 4) best entry strategies into the marketplace. The final report will inform Canadian businesses which domestic building products have a strong potential for export from Canada to the Trinidad and Tobago construction market.

**CMHC Project Officer :** *Ronald Drisdelle*  
**Division :** CMHC International  
**AVAILABILITY :** Product is not yet available

**CIDN :** 43120900  
**STATUS :** Ongoing  
**\*NEW\***

### STUDIES TO ADVANCE ACCEPTANCE OF WOOD-FRAME IN MULTI-UNIT DWELLINGS IN FRANCE

The purpose of this project is to position Canadian technology as one of the most technically efficient concerning technical regulations and energy efficiency in comparison to the traditional building techniques and particularly in multi-family building where Canadians face less local competition. The objective is to increase the market share of current Canadian clients established in France, and to address technical concerns and myths about wood-frame multi-family buildings.

**CMHC Project Officer :** *Terry Robinson*  
**Division :** CMHC International  
**AVAILABILITY :** Product is not yet available

**CIDN :** 42170900  
**STATUS :** Ongoing

### STUDY OF PASSIVHAUS TRENDS

The PassivHaus movement, which promotes very low energy housing, is generating considerable interest and media coverage, especially in Europe, as the future direction for energy efficient housing. This project's purpose is to document how PassivHaus standards compare to Canadian technology such as Super E or EQuilibrium Net Zero. Being able to build to PassivHaus standards or to demonstrate equivalent or superior performance will allow Canadians to supply leading-edge developments. This study will also look at how best to position Canadian technology and brands to take advantage of the current interest in PassivHaus.

**CMHC Project Officer :** *Jorge Malisani*  
**Division :** CMHC International  
**AVAILABILITY :** Product is not yet available

**CIDN :** 42320900  
**STATUS :** Ongoing  
**\*NEW\***

### SUPER E PROGRAM IN FOREIGN MARKETS

The project will contribute to the activities of the Energy Efficient Exporters' Alliance (EEEA) in assisting Canadian housing system suppliers to construct energy efficient, healthy homes with high Canadian content in foreign markets. CMHC's contribution is directed towards seminars, training for members, annual Super E member forums, support for project development, quality assurance, testing and trouble shooting.

**CMHC Project Officer :** *Brian Eames*  
**Division :** CMHC International  
**AVAILABILITY :** Product is not yet available

**CIDN :** 40070900  
**STATUS :** Ongoing

## HOUSING EXPORT OPPORTUNITIES

### SUPER E PROGRAM/NET ZERO IN FOREIGN MARKETS

The project will contribute to the activities of the Energy Efficient Exporters' Alliance (EEEE) and its member companies in assisting Canadian housing system suppliers to construct energy efficient, healthy homes with high Canadian content in foreign markets. CMHC's contribution is directed towards seminars, training for members, and support for project development.

**CMHC Project Officer :** Brian Eames

**CIDN :** 42090900

**Division :** CMHC International

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## HOUSING FINANCE

### SURVEY OF ISSUES AND CHALLENGES TO PROVIDING MARKET HOUSING FINANCE IN THE NORTHERN TERRITORIES

The goal of this research project is to identify and examine gaps and issues, if any, related to mortgage financing and other issues impeding the financing of market housing in the North. The research will focus on housing financing in the North by examining the issues faced by:

- a) lenders in providing mortgage financing for homeowners and private rental housing; and
- b) individual home-buyers and rental developers in obtaining mortgage loans.

The research will also consider the effects of non-market housing activities (e.g. social housing, territorial government staff housing, and industry-provided worker housing) on housing finance and the growth of market-based housing as it relates to the above-mentioned research focus.

**CMHC Project Officer :** Michel Blondin

**CIDN :** 39590200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UPDATING CMHC'S ON-LINE CONDOMINIUM BUYERS' GUIDE

This project will update CMHC existing "Condominium Buyers Guide", and extend it by adding provincial and territorial fact sheets (analogous to those in "Your Guide to Renting a Home") since condominium legislation and regulations are made at the provincial /territorial level of government, and by providing the substantive input necessary to convert the resulting guide to a true on-line guide with links to other on-line sources of information (e.g. from provincial /territorial governments and non-governmental organizations).

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 40380200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



## HOUSING INDICATORS AND DATA

### CANADIAN HOUSING OBSERVER 2012

The Canadian Housing Observer is a flagship CMHC publication which provides comprehensive and authoritative reporting on the state of Canada's housing. The Observer is published annually, and is available in print and electronic formats. The analysis presented in the Observer, coupled with the extensive on-line data resources, provides Canada's housing sector with an indispensable tool for identifying, monitoring and addressing housing trends and issues.

**CMHC Project Officer :** Sandra Baynes

**CIDN :** 43200200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### LOCATION AND GASOLINE PRICE AS COFACTORS IN HOME PRICES

This External Research Program project will assess the possible impacts of changes in gasoline price on home prices in parts of the Toronto and Vancouver regions and discuss the assessment. The hypothesis to be tested is that high or rising gasoline prices enhance the price of centrally located homes in these urban regions in comparison with homes that are less centrally located (and vice versa: low or falling gasoline prices have the opposite effect).

**CMHC Project Officer :** Susan Fisher

**CIDN :** 40140214

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## INDOOR ENVIRONMENT

### CANADIAN RADON MITIGATION CASE STUDIES

The project will investigate the performance of subslab depressurization radon mitigation systems installed in 20 Canadian houses. Field testing will show whether houses with existing systems have problems with exhaust duct leakage or foundation chilling. The testing will also help quantify the possibility of icing with vertical stacks, the proportion of indoor air that is exhausted from these depressurization systems, and the contribution of these exhaust fans to house depressurization. The results of this research will help to shape Canadian radon mitigation training and the radon advice provided to consumers by CMHC and Health Canada.

**CMHC Project Officer :** Regina De La Campa

**CIDN :** 39790200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### REVIEW OF THE RELATIONSHIP BETWEEN HOUSE VENTILATION RATES AND HEALTH

This work, being led by Quebec public health agency (INSPQ) and National Research Council (NRC), is attempting to establish the relationship between adequate ventilation and health (or inadequate ventilation and poor health), through literature searches and appropriate field testing. The project should lead to a better understanding of the relationship between house ventilation and occupant health. If the project establishes a strong correlation between good ventilation and healthy residents, it will be useful material for building codes, medical authorities, ventilation standards, and the ventilation industry. The first year involves house and occupant characterization. CMHC is supporting the characterization of the houses. All the houses will have two airtightness tests and 4-5 tracer gas air change rate tests, as well as measurements of the indoor air quality and occupant health status. Starting the fall of 2010, half the sample houses will have their ventilation rate increased by 0.15 air changes per hour, and the health status of the asthmatic children will be monitored for one year to see if the increased ventilation results in health benefits. CMHC will be releasing a Research Highlight on the air change rates and airtightness data of this housing sample.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 35560200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUPPORT FOR IAQ/HOUSE CHARACTERIZATION AND DATA ANALYSIS - MCMASTER UNIVERSITY CHILD STUDY

CMHC is supporting this multi-year, inter-institute collaborative research study to address the influence of indoor environments on asthma and allergy. The study will follow 5000 pregnant women and their children, from birth to 5 years of age, to understand the indoor environmental exposures that may result in allergic and respiratory disease. Among other things, the research will provide information on housing characteristics, occupant factors related to the operation of the houses and the presence of indoor biological contaminants. CMHC has led four rounds of in-depth technical training to research assistants who will use home assessment questionnaires during walk-through home visits with the participating families. The pilot phase of the study closed on December 15, 2008, with 200 mothers and children recruited over a two month period. Important information on recruitment strategies, questionnaires, home assessments and birth events has been collected. The questionnaires and home assessments have been reviewed and improved. The study has now moved to the implementation phase, with over 2000 families recruited among the four centres (Vancouver, Edmonton, Winnipeg and Toronto).

**CMHC Project Officer :** Regina De La Campa

**CIDN :** 35580200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SURVEY OF CHARACTERISTICS IN HOMES WITH ELEVATED RADON LEVELS

This project was funded as part of the CMHC External Research Program to survey houses in a radon-prone area of Winnipeg. The purpose of the study was to investigate the correlation of radon data for three testing periods in 50 homes. Houses were tested for radon over 5 days, 30 days and 90 days during the 2009-2010 heating season. In addition, the project team collected information on housing characteristics to investigate the impact of house features on radon concentrations in these houses. The efficacy of a simple remedial measure, a floor drain seal on radon concentrations, was also investigated.

**CMHC Project Officer :** Regina De La Campa

**CIDN :** 40140203

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## INFRASTRUCTURE

### CASE STUDIES OF GREEN INFRASTRUCTURE PERFORMANCE AND COSTS

This project will produce a series of case studies documenting various green infrastructure implementations in residential developments and in particular their performance, costs and cost trade-offs compared to conventional approaches.

**CMHC Project Officer :** Cynthia Rattle  
**Division :** Policy and Research Division  
**AVAILABILITY :** Product is not yet available

**CIDN :** 41840200  
**STATUS :** Ongoing

### ECONOMIC QUANTIFICATION OF THE "SOFT" BENEFITS OF GREEN INFRASTRUCTURE

This External Research Program project is focused on the following question: How can we value the "soft" (difficult to quantify) benefits associated with various types of green infrastructure? The objectives of the study are as follows:-- determine the full range of soft benefits associated with green infrastructure;-- identify the key benefits that are the most feasible to quantify;-- explore evaluation methodologies for each of the key benefits; and -- provide tangible development scenarios showing how the evaluation methodologies could be applied "on the ground".

**CMHC Project Officer :** Mark Holzman  
**Division :** External Research Program  
**AVAILABILITY :** Product is not yet available

**CIDN :** 38840216  
**STATUS :** Ongoing

## MOISTURE AND MOLD

### CONTRIBUTION TO THE INDUSTRIAL RESEARCH CHAIR IN ALLERGENS AND TOXINS FROM MOLDS IN THE BUILT ENVIRONMENT

CMHC is supporting the ongoing research of the National Science and Engineering Research Council Chair on Allergens and Toxins from Molds in the Built Environment at Carleton University.

Currently, there is no method to obtain a quick and inexpensive determination of the nature of mold contamination in a house. A more fundamental understanding of the by-products of mold that are harmful to people is needed along with knowledge regarding the thresholds that should be avoided. The first five year's work of the Chair developed the expertise to identify human allergens from *Stachybotrys chartarum*, *Aspergillus versicolor* and *Penicillium chrysogenum*, three representative species of fungi found in Canadian houses that require large, medium and low amounts of moisture to grow. The team then produced antibodies specific to each allergen, isolated and tested the effect of the toxins these species produced on lungs cells. The second five years, 2006-2011, expanded the work to a larger number of mold species to make it feasible to use these reagents as an inexpensive and reliable way of testing for mold contamination in houses.

**CMHC Project Officer :** Regina De La Campa  
**Division :** Policy and Research Division  
**AVAILABILITY :** Product is not yet available

**CIDN :** 34070200  
**STATUS :** Ongoing



### LITERATURE REVIEW ON HISTOPLASMA, BLASTOMYCES AND CRYPTOCOCCUS GATTII AND THE IMPLICATIONS FOR THE DESIGN, OPERATION AND MAINTENANCE OF HOUSING

This project is being conducted to compile scientific literature on fungi that may be found in and around housing. A thorough literature review of *Histoplasma capsulatum*, *Blastomyces dermatitidis* and *Cryptococcus gattii*, three fungi that cause infectious diseases in people was conducted by a mycology expert. Histoplasmosis occurs from exposure to feces of birds and bats, while blastomycosis occurs after exposure to the spores in soil. Infections due to *Cryptococcus gattii* are limited to Vancouver Island, though cases have been seen in Vancouver. The literature review will form the basis of housing advisories on how to avoid exposure to these fungi in residential settings. The project is a collaborative effort between CMHC and Health Canada.

**CMHC Project Officer :** Regina De La Campa

**CIDN :** 36350200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### WATER PENETRATION THROUGH BRICK VENEER WALLS

This report arose in response to the goal of manufacturers of clay brick products to reduce the environmental footprint of their products. As the manufacturing process of clay products has become more energy efficient in recent years, further improvement may be achieved by reducing the thickness of veneer brick. This reduction in thickness would decrease the embodied energy of the product itself and the environmental impact associated with transportation and construction. However, maintenance during the life of buildings influences their overall environmental impact and therefore the durability of the thinner brick is of a concern. The durability referred to in this report is related to water penetration and water absorption of the brick veneer. This report focuses on issues of performance of veneer walls of two different thicknesses subjected to wind driven rain. The impacts of dimensional changes on water absorption by the wall and water penetration into the cavity are studied. It focuses on two sets of 90 mm-deep units and two sets of 75 mm-deep units from two different manufacturers. Each set has different void configurations but approximately the same void percentage. All bricks meet the durability criteria for extreme climatic exposure.

The report presents the results of 34 tests on these veneer walls in accordance with ASTM E 514, and of extensive testing to determine properties of clay bricks. Parameters such as variation in wind pressure and amount of rain are addressed. Test results lead to the conclusion that the thinner veneer walls do not perform any worse than standard veneer walls; workmanship and brick absorption characteristics have greater influence on wall behaviour with regard to wind driven rain.

*Prepared by: Vera Straka and Mark Gorgolewski, Department of Architectural Science, Ryerson University.  
CMHC Project Officer: Silvio Plescia. Ottawa: Canada Mortgage and Housing Corporation, 2011.  
(External Research Program Report) Main report (54 pages) + Appendices (61 pages)*

**STATUS :** New Completed Report

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research/Reports-Rapports\\_de\\_recherche/eng\\_unilingua/1/Ca1%20MH%2011W16\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research/Reports-Rapports_de_recherche/eng_unilingua/1/Ca1%20MH%2011W16_w.pdf) (main report) (2.97 MB)

[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research/Reports-Rapports\\_de\\_recherche/eng\\_unilingua/1/Ca1%20MH%2011W16%20App\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research/Reports-Rapports_de_recherche/eng_unilingua/1/Ca1%20MH%2011W16%20App_w.pdf) (appendices) (1.67 MB)

## NORTHERN HOUSING

### CMHC/NWTHC NORTHERN SUSTAINABLE HOUSE (A-BASE)

The project will develop a prototype for the construction of culturally appropriate highly energy efficient housing throughout the Northwest Territories (NWT). It is expected that the design and construction and the cost/benefit analysis of the house will assist in facilitating the use of construction details and practices throughout the NWT and the North that significantly improve building performance. Construction of the house was completed in 2011. The energy performance of the house will be monitored for a period of 15 months post-occupancy during the 2012/13 heating season to determine the extent to which the performance targets have been realized. A final report on the project will be completed by the end of 2013.

**CMHC Project Officer :** William Semple

**CIDN :** 39850200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### FUNDING SUPPORT FOR THE NORTHERN SCIENTIFIC TRAINING PROGRAMME

The Northern Scientific Training Programme (NSTP) supports northern research studies by providing universities with funding to help offset the costs associated with travel, accommodation, and interpreter fees in the North. This project provides support for community-based research and support to traditional knowledge by providing support to Canadian universities in providing training that gives advanced and graduate students the opportunity to gain professional experience in the Canadian North. The project increases research capacity within the North, contributes to the research work, and provides northern peoples with enhanced learning, training and employment opportunities within their communities. The project provides funding to the NSTP over a five year period from 2009 to 2013.

**CMHC Project Officer :** William Semple

**CIDN :** 37850200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### INTEGRATED DESIGN AND EVALUATION OF A CONSTRUCTED NORTHERN SUSTAINABLE HOUSE (E/2 PROTOTYPE)

In this project, two "Northern Sustainable Houses" have been designed by CMHC in partnership with a Tr'ondek Hwech'in First Nations community in the Yukon and the Nunavut Housing Corporation in Arviat, Nunavut. The houses have been designed to consume less than 50% of the Model National Energy Code of Canada for Houses energy requirements, and are suited to the northern culture and lifestyles. The project has incorporated local knowledge and experience of members of the northern communities and territorial housing providers where the houses were located. Construction of the Tr'ondek Hwech'in House was completed in January, 2008. Materials for the NHC Arviat House have been sea-lifted to the community and construction will start in the summer of 2012. The evaluation of the projects will include monitoring the energy performance of the constructed houses, carrying out a cost/benefit analysis of the energy savings of each Northern Sustainable House vs. a typical new house in the community, and carrying out an analysis of the success of the cultural issues being addressed in the design. CMHC facilitated design workshops, was the lead in designing the houses, and is undertaking the performance evaluation of the Northern Sustainable House Prototypes. A 15 month monitoring project and report on the completed Tr'ondek Hwech'in House was completed in December 2009. A report on the Arviat Northern Sustainable house is expected to be completed by the end of 2014. The project is funded in part by the Program for Energy Research and Development (PERD).

**CMHC Project Officer :** William Semple

**CIDN :** 33240200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## PERSONS WITH DISABILITIES

### IMPROVEMENTS TO THE CANADIAN CENTRE OF HOUSING TECHNOLOGY (CCHT) FLEX HOUSE UNIT

This project will upgrade the CCHT FlexHouse to current accessibility standards, and update its capacity and appearance to promote the concept to stakeholders. The project will convert the ground floor into a separate apartment with a small main floor addition and an accessible outdoor deck. The addition will also provide an opportunity to demonstrate new energy efficient construction and technologies that support the concept of sustainable renovations. A marketing and communication plan will also be developed to promote the FlexHouse concept, accessibility, visitability and aging in place.

**CMHC Project Officer :** Ken Ruest

**CIDN :** 43520200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

**\*NEW\***

### PATTERNS OF USE OF DIFFERENT TOILET GRAB BAR CONFIGURATIONS

A previous study looking at different toilet grab bar configurations showed that ambulatory and non-ambulatory seniors highly prefer the presence of a grab bar on both sides of the toilet seat contrary to American and Canadian recommended guidelines. This External Research Program study will focus on the "patterns of use" of six (6) different toilet grab bar configurations having grab bars on both side of the toilet seat.

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 34380216

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## RENOVATION AND INSPECTION

### ESTIMATING THE COSTS AND BENEFITS OF HOME RENOVATIONS TO ACCOMMODATE AGING AND DISABILITY

This project will apply the new CMHC cost-benefit framework, or model, to estimate the costs and benefits of home renovations to accommodate aging and disability relative to long-term care institutionalization. The project will include a national survey, involving personal interviews with at least 250 RRAP-D and HASI program beneficiaries and 200 telephone surveys to generate statistically reliable estimates of the costs and benefits. At least 50 caregivers of program beneficiaries will also participate. Following the conduct of the surveys, the resulting cost and benefits of the renovations will be compared with available data on the cost and benefits of long-term care institutionalization. This project will produce estimates of the costs and benefits, and cost-benefit ratios, of home renovations to accommodate aging and disability. Such estimates would be useful to policy at the Federal/Provincial/Territorial/Municipal levels related to funding such housing renovations and to the health services sector, regarding related support services programs for seniors and persons with disabilities. The societal impact on care giving and the health care sector will be examined.

**CMHC Project Officer :** Ian Melzer

**CIDN :** 35440200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## RENOVATION AND INSPECTION

### GREEN RENOVATION GUIDE FOR RENOVATORS

Under this project, CMHC will work closely with industry to develop a guide for renovators on sustainable "Green" renovation for their clients. The Guide will be developed with the support of the Canadian Home Builders' Association and will include products and practices that can improve the overall environmental performance of a renovation; how to avoid "greenwash"; Healthy Housing tips; how to avoid renovation pitfalls that can undermine the post-renovation performance of a house; and simple diagnostics for common technical problems for various types of residential renovation projects. A draft manuscript has been prepared and is currently being reviewed by the industry.

**CMHC Project Officer :** Ken Ruest

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 40940200

**STATUS :** Ongoing

### NEAR NET ZERO: ENERGY RETROFITS FOR HOUSES

The purpose of this study was to examine and develop recommendations for Energy Efficiency Measures (EEMs) that are applicable for 4 representative housing archetypes across Canada.

A literature review was utilized to identify a comprehensive list of potential EEMs for roofs, above grade walls, windows, below grade walls and slab-on-grade construction. These EEMs were then evaluated for each of the 4 housing archetypes and 14 Canadian municipalities relative to construction feasibility, energy savings potential, cost to implement, and cost effectiveness.

The energy usage characteristics were evaluated using HOT2000 Version 10.51. Building enclosure EEMs packages (groups of EEMs for particular housing archetype) that provided an Energuide for Houses (EGH) rating of 83 were used as a benchmark of a high-performance, or a near net zero building enclosure. All simulations used mid-level efficiency mechanical equipment and standard Energuide assumptions so that the only variables were the building enclosure retrofit measures.

In addition to the energy analysis and assessment of cost effectiveness, the evaluation of EEMs considered other building science performance issues, in particular hygrothermal performance. Conceptual details for EEM packages were developed to address the retrofit situation for each of the 4 housing archetypes.

*Prepared by RDH Building Engineering Ltd. and Habitat Design + Consulting Ltd. CMHC Project Officer: Barry Craig. Ottawa: Canada Mortgage and Housing Corporation, 2011. 282 pages (8.90 MB)*

**STATUS :** New Completed Report

**AVAILABILITY :** Canadian Housing Information Centre and

[http://ftp.cmhc-schl.gc.ca/chic-ccdh/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu al/Can\\_MH\\_11N25\\_w.pdf](http://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingu al/Can_MH_11N25_w.pdf)

## RENTAL HOUSING

### REGULATIONS IN THE RESIDENTIAL CONSTRUCTION INDUSTRY IN QUEBEC AND THEIR EFFECTS ON THE COST OF RENTAL HOUSING

This research assesses the impact of the variety of regulations affecting residential construction in Quebec on the cost of rental housing. The research includes a literature search of residential building regulations and interviews with experts in the housing industry, building officials in the Ville de Québec, representatives of the Commission de la construction du Québec (CCQ), l'Association de la construction du Québec (ACQ), the Corporation des entrepreneurs généraux du Québec (CEGQ), and several residential builders. The research includes estimates of the costs of residential construction attributed to these regulations, and their effects on housing rents.

**CMHC Project Officer :** Barry Craig

**CIDN :** 28920202

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UPDATING YOUR GUIDE TO RENTING A HOME AND GUIDE TO CO-OP HOUSING

This project will provide for updating of the substantive content of CMHC's online rental guide ("Your Guide to Renting a Home") annually, and of CMHC's online "Guide to Co-operative Housing" every second year; of the live links contained in these guides every four months, and of the non-link information contained in these guides annually. It will also provide for the handling of enquiries as received and the potential addition of new sections to the guides.

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 39660200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## RESIDENTIAL DEVELOPMENT

### CITIZEN'S GUIDE TO DENSITY: UNDERSTANDING RESIDENTIAL DENSITIES IN THE GREATER GOLDEN HORSESHOE

Density targets, a discrete measure of density designed to curb sprawl and encourage compact, sustainable development, are useful benchmarks for planners, architects and developers, but are often unintelligible to the average citizen. Driven by provincial growth directives, municipalities in the Greater Golden Horseshoe are struggling with how to translate density targets into tangible and meaningful examples. This External Research Program research seeks to demonstrate how this can be done through the development of a handbook that will illustrate and simply communicate residential densities that contribute positively to the public realm.

**CMHC Project Officer :** Cynthia Rattle

**CIDN :** 40140218

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



## RESIDENTIAL DEVELOPMENT

### IN PURSUIT OF SUSTAINABLE NEIGHBOURHOOD DEVELOPMENT PATTERNS: THE NEXT STEP - A ROAD SAFETY EVALUATION OF ROAD NETWORK PATTERNS, INCLUDING CMHC'S FUSED GRID ROAD NETWORK PATTERN

The objectives of this External Research Program project are: (1) to develop models for use by Ottawa planners and engineers to do empirical road safety planning; (2) to apply these models in a case study using actual data, to evaluate the level of safety of CMHC's Fused Grid pattern; and (3) to compare the road safety of the Fused Grid road network with four other road network patterns.

**CMHC Project Officer :** Mark Holzman

**CIDN :** 38840212

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## SENIORS

### CERTIFICATION OF SENIORS' RESIDENCES IN QUEBEC: FACILITATING AND CONSTRAINING FACTORS

In February 2007, the Government of Quebec introduced a mandatory process for the compliance certification of all seniors' residences. The development and application of such a process pose major challenges for the different stakeholders in this process in order to meet organizational changes and the standardization of a series of practices that are now imposed in this sector. This External Research Program study aims to highlight the positive factors and constraints perceived by three of the stakeholders in this process, namely, the operators, the agencies and the "Conseil québécois d'agrément" (Quebec certification council).

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 40140212

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### ENVIRONMENT SCAN ON CANADIAN SENIORS' TRANSITIONS TO SPECIAL CARE FACILITIES

The objective of this research is to review the literature and produce an annotated bibliography, and compile and analyze available data on housing transitions to special care facilities by Canadian seniors (aged 65+).

**CMHC Project Officer :** Ian Melzer

**CIDN :** 41110200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



## SENIORS

### UPDATING THE PUBLICATION "HOUSING FOR OLDER CANADIANS: THE DEFINITIVE GUIDE TO THE OVER 55 MARKET"

This project will focus on updating the publication "Housing for Older Canadians: The Definitive Guide to the Over-55 Market", published by CMHC in 1999. The updated product will comprise a series of shorter publications that are based on updated content and that focus on a narrower range of topics. The new product will be available in both print and web formats and will make the information more accessible to the industry at a time when the market for seniors' housing is growing.

**CMHC Project Officer :** Hoda Shawki

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 39690200

**STATUS :** Ongoing

## SOCIAL HOUSING

### CASE STUDY RESEARCH ON SOCIAL HOUSING REDEVELOPMENT AND REGENERATION

This report summarizes findings of a research study on the regeneration and redevelopment of social and affordable housing in Canada. The research was undertaken in 2010 and the final report was completed in 2011. The study investigated approaches used in regeneration and redevelopment and identified lessons learned in past projects. The research included literature and document reviews, an on-line survey of the housing sector, and detailed case studies of 8 housing redevelopment projects that included interviews with housing agencies involved in the redevelopments.

*Prepared by SPR Associates. CMHC Project Officer: Janet Neves. Ottawa: Canada Mortgage and Housing Corporation, 2011. 167 pages (2.56 MB)*

Note: No. 11-006 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 67556)

**STATUS :** New Completed Report and Research Highlight

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccd/R/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_bilingual/CAI\\_MH\\_11C17\\_W.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccd/R/Research_Reports-Rapports_de_recherche/eng_bilingual/CAI_MH_11C17_W.pdf)

### DO SOCIAL HOUSING ALLOCATION METHODS HAVE AN EFFECT ON THE WELL-BEING AND HEALTH OF FAMILIES? A COMPARISON OF LOW-RENT HOUSING PROGRAMS AND RENT SUPPLEMENT PROGRAMS IN MONTRÉAL

This External Research Program project will compare the levels of well-being and health of families under two social housing programs in Montréal.

**CMHC Project Officer :** Jim Zamprelli

**Division :** External Research Program

**AVAILABILITY :** Product is not yet available

**CIDN :** 41330204

**STATUS :** Ongoing

## SOCIAL HOUSING

### REGENT PARK LONGITUDINAL HEALTH STUDY

This study will investigate the effects of the Regent Park Social Housing Revitalization Project - Phase I Redevelopment on the health and well-being of residents, and how interventions in the built environment may reduce health inequalities and improve the lives of low-income, urban populations, using a quasi-experimental research design. The redevelopment plan seeks to: a) create social mix; b) promote positive social interaction (using innovative architectural and urban designs); and c) create affordable home ownership for a subset of residents.

**CMHC Project Officer :** Mark Salerno

**CIDN :** 34470200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUPPORTIVE/SUPPORTED HOUSING WITHIN SOCIAL HOUSING

This project will examine the role of social housing in providing the housing component of supported/supportive housing, to include: a description of supported or supportive housing models within social housing and an estimate of its prevalence; an analysis of the experiences with supported/supportive housing within social housing, from the point of view of housing providers, service providers, residents and government agencies; a review of successful partnerships, lessons learned and best practices in the provision of supported/supportive housing.

**CMHC Project Officer :** Jim Zamprelli

**CIDN :** 38220200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

### ACHIEVING 90% REDUCTION IN ENERGY CONSUMPTION IN SUSTAINABLE NORTHERN HOUSES

This project applies Net Zero (Equilibrium) technology to the design of a house to be built in the Yukon with the objective of having the home consume up to 90% less heating energy than the amount used by the house were it to be built to the Model National Energy Code for Houses (MNECH). CMHC provided technical information and support for the designs and architectural drawings prepared by the Tr'ondek Hwech'in First Nation Band. A mechanical consultant with experience in the design of renewable energy systems and proficient with Hot2000 computer modelling designed the mechanical systems, provided layout drawings, and simulated estimated energy consumption for a family of two adults and two children. The energy consumption of the dwelling was monitored for one year following occupancy. The project produced a research report that may assist in designing and building sustainable housing and establish the feasibility of near net zero energy houses in the North.

**CMHC Project Officer :** Barry Craig

**CIDN :** 38260200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### ANALYSIS OF PASSIVE SOLAR DESIGN FEATURES OF EQUILIBRIUM™ HOUSES

This project will take advantage of the existing Equilibrium™ homes and the availability of detailed energy simulation tools in order to increase the understanding of how to maximize passive solar energy in houses while limiting the risk of overheating. This will help reduce space heating needs, energy consumption and greenhouse gas emissions while improving comfort conditions.

**CMHC Project Officer :** Duncan Hill

**CIDN :** 40650200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### COMMUNITY ENVIRONMENTAL (CARBON FOOTPRINT) REDUCTION PROJECT

This External Research Program project will test the effectiveness of a community based approach to reducing the environmental carbon footprint of individual households in existing neighbourhoods. It will investigate the differences in footprint between neighbourhood and housing types, the environmental measures most likely to be implemented by residents, and the results of these actions.

**CMHC Project Officer :** Meg Ogden

**CIDN :** 40140217

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### CONTINUING EDUCATION ARTICLES FOR ARCHITECTS (A-BASE)

This project will serve to inform architects about measures and strategies to improve the sustainability of housing and communities. The project provides CMHC with an opportunity to provide a key stakeholder audience with information on housing performance topics representing current Corporate research and information transfer priorities.

**CMHC Project Officer :** Barry Craig

**CIDN :** 40750200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### EARTH TUBE VENTILATION SYSTEMS – APPLICABILITY IN THE CANADIAN CLIMATE

This project investigated the available literature for evidence regarding the performance of residential earth tube ventilation systems. Designers, and users were also interviewed and Internet searches were also included in the study. The aim was to determine the extent of information available to validate or dispel whether earth tubes are a good option for reducing ventilation related energy use in houses in northern climates, and under what conditions this may be the case. Over 45 publications were analyzed and summarized. Close to 30 residential systems in existence or being built were identified. However, there was no validated monitoring data to demonstrate the energy benefits in Canadian climate conditions. Existing system users expressed general satisfaction with the system, but objective performance indicators are lacking. Other users reported that their systems do not always work as expected. The literature shows that strictly from an energy point of view, there is very strong evidence that combining an earth tube and a heat recovery ventilator (HRV) provides little benefits in heating mode. This is also confirmed by several experimental

## SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

studies. The main finding of this study is that the performance of earth tubes in most of Canada's climatic conditions has not yet been demonstrated through validated rigorous energy and air quality monitoring. Until such data can be obtained, the findings of this study need to be carefully evaluated prior to undertaking any such installation.

*Prepared by Didier Thevenard, Numerical Logics Inc. CMHC Project Officer: Ken Ruest. Ottawa: Canada Mortgage and Housing Corporation, 2011. 56 pages (473.19 KB)*

Note: No. 11-103 in the Research Highlights Technical Series summarizes the results of this research and is available on the CMHC web site (Order number 67558)

**STATUS :** New Completed Report and Research Highlight

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu  
al/CAI\\_MH110\\_11E17\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingu<br/>al/CAI_MH110_11E17_w.pdf)

### EQUILIBRIUM™ COMMUNITY DEMONSTRATION INITIATIVE

Equilibrium™ Communities is a four-year, \$4.2M collaborative sustainable community demonstration initiative of CMHC and NRCan under the ecoACTION umbrella. The objective is to accelerate sustainable community development in Canada through demonstration of sustainable planning and development at the neighbourhood scale. The initiative provides financial assistance for technical activities and showcasing the performance of neighbourhood development projects which, through their planning, design, implementation and operation, will provide measurable improvements over traditional approaches. See <http://www.cmhc-schl.gc.ca/en/inpr/su/eqsucoin/index.cfm> for published products to date, including project overviews and a product on the 18 indicators that formed part of the selection criteria. More products will be made available as the Initiative progresses.

**CMHC Project Officer :** Susan Fisher

**CIDN :** 39550200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is available on the web

### ESTIMATING THE GREEN HOUSE GAS IMPLICATIONS OF LAND-USE PATTERNS: A METHODOLOGY FOR LOCAL GOVERNMENTS

This External Research Program project will develop a dedicated tool to empower communities to define parameters and subsequently assess the energy and greenhouse gas (GHG) emission implications of planning decisions. It will build upon and extend research completed for Salt Spring Island, BC, which examined the long-term greenhouse gas implications of different build-out scenarios and found that significant current GHG emissions savings were achievable. This project will result in a model that can be deployed by small and medium sized communities to measure the greenhouse gas implications of planning scenarios.

**CMHC Project Officer :** Meg Ogden

**CIDN :** 40140215

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### FAMILIES LIVING DOWNTOWN: CHALLENGES AND BENEFITS

This External Research Program study will examine the housing-related experiences of families who are choosing to live in or near downtown areas. It will examine the reasons for their choice, how they are managing their urban life with their children, and the challenges and benefits they experience once they have lived there for some time. These experiences will be related to key objective measures of their own residence and their downtown neighbourhood. This research will complement previous views on how to plan central areas for families by studying the experiences of downtown family residents, those who actually "live their life" there.

**CMHC Project Officer :** Mark Holzman

**CIDN :** 34380210

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### INDEX FOR LANDSCAPE GUIDE FOR CANADIAN HOMES

This project will add the following new and updated features in "Landscape Guide for Canadian Homes": an index, photos of each plant in the plant list, plus updates to the "resources and further reading" section.

**CMHC Project Officer :** Susan Fisher

**CIDN :** 36710200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### LIFE CYCLE ENVIRONMENTAL ASSESSMENT BENCHMARK STUDY OF SIX CMHC EQUILIBRIUM™ HOUSING INITIATIVE PROJECTS

In 2006, CMHC launched a "Net Zero Healthy Housing" demonstration project called the EQUilibrium™ (EQ) Sustainable Housing Demonstration Initiative. For the purpose of this study, "net zero" means that over the course of a year a house is capable of producing the same amount or more energy than it consumes in that same year.

This research project assessed six EQUilibrium™ houses. Using a holistic life cycle assessment (LCA) framework, the study determined the embodied and operating effects of these dwellings relative to more conventional minimum code and more advanced housing options across a comprehensive set of environmental impact indicators.

*Prepared by Athena Sustainable Materials Institute. Athena Project Manager: Jamie Meil. CMHC Project Officer: Woytek Kujawski. Ottawa: Canada Mortgage and Housing Corporation, 2011. 154 pages (1.49 MB)*

**STATUS :** New Completed Report

**AVAILABILITY :** Canadian Housing Information Centre and

[ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research\\_Reports-Rapports\\_de\\_recherche/eng\\_unilingu al/Can%20MH%20110%202011L31\\_w.pdf](ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingu al/Can%20MH%20110%202011L31_w.pdf)



### **NSERC CANADIAN UNIVERSITY NETWORK ON "SOLAR ENERGY UTILIZATION IN BUILDINGS"**

CMHC is supporting a new Natural Sciences and Engineering Research Council of Canada (NSERC) funded University Network on "Solar Energy Utilization in Buildings", to achieve the objective of enhancing the capacity of the residential industry to develop solar buildings with substantially reduced purchased energy needs. The overall vision of the Network over its five year period will be to advance the adoption of new knowledge, tools, practices and technologies for cost effective construction of solar zero-net-energy buildings in Canada.

The main objectives of the Network over its five-year research program are the following:

1. To develop effective techniques for integration of solar collection, storage and utilization systems in the building envelope.
2. To develop and improve solar energy utilization technologies so as to reduce cost and raise overall efficiency.
3. To develop and demonstrate affordable, reliable, building integrated, distributed power generation systems based on solar energy for residential and commercial buildings.
4. To develop simulation design tools and methodology that may be effectively utilized throughout the design process.
5. To transfer these outputs to the end users.
6. To contribute to the development of government policies and programs aimed at fostering the adoption of solar technologies in buildings.

CMHC will seek opportunities to transfer the knowledge gained through the network research to stakeholders in the housing industry.

**CMHC Project Officer :** *Duncan Hill*

**CIDN :** 34020200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### **PAYBACK PERIOD FOR "SUSTAINABLE" BUILDING FEATURES IN SINGLE FAMILY DETACHED DWELLINGS**

This project built a framework to profile the attributes of various "sustainable" building features available for single family detached dwellings and to estimate the payback periods of different sustainable features. Generic sustainable features were profiled to increase the understanding of consumers, and industry, of the costs and benefits of "building sustainable" in the single family market. After final approval and adjustments, if necessary, the initial 10 sustainable building feature profiles will be published to enable consumers and the home building industry to objectively evaluate "sustainable" features that they wish to incorporate into their homes.

**CMHC Project Officer :** *Woytek Kujawski*

**CIDN :** 38320200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available



### POTENTIAL OF REPLOTTING TO IMPROVE THE SUSTAINABILITY OF CITIES IN WESTERN CANADA

This External Research project is based on the hypothesis that replotting can be employed as a useful tool for developers and housing/planning authorities to assist in certain land assembly situations. The research will investigate whether the replot legislation extant in western Canada could be used to overcome a weakness often seen in the land development process in urban intensification locales, and thereby show how governments and developers can bring about better developments that will contribute to improving the sustainability of cities.

**CMHC Project Officer :** Cynthia Rattle

**CIDN :** 40140216

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### REGIONAL PILOT DEMONSTRATION OF NET ZERO ENERGY HEALTHY HOUSING

This project involves the development of a national net zero energy healthy housing demonstration and implementation initiative through an industry partnership to advance new Canadian housing towards a net zero energy consumption and low environmental impact goal. The concept involves the design, construction, demonstration and monitoring of net zero energy healthy houses in a project called the EQUILIBRIUM™ Sustainable Housing Demonstration Initiative. Initially, a total of fifteen projects from across the country were selected in two separate national competition calls, with twelve projects of these continuing towards the construction/demonstration/monitoring phases of the Initiative. Construction has been completed on 11 projects with the next expected to follow in the next year. All constructed EQUILIBRIUM™ Housing projects are open for public and professional tours for a minimum time period of six months. Demonstrations permit CMHC and the EQUILIBRIUM™ Housing Teams to show their achievements to the residential building industry and consumers. Upon completion of the demonstrations, the houses are sold and CMHC monitors the performance of the houses for one year post occupancy. Based on the outcome of this demonstration initiative, CMHC will explore with its partners and stakeholders opportunities to expand this initiative more broadly across Canada. The EQUILIBRIUM™ Sustainable Housing Demonstration Initiative is based on CMHC's five principles for Healthy Housing (Health, Energy, Resources, Environment, and Affordability). It combines passive solar, energy efficient design, construction and appliances, with commercially available grid tied renewable energy systems to achieve net zero energy consumption on an annual basis, reduced green house gas (GHG) emissions, and low environmental impact. The intended results and impacts of the EQUILIBRIUM™ Housing initiative are to showcase readily available and affordable sustainable housing solutions that are transferable to the mass market, develop strategic alliances between industry and government to reduce the energy intensity of our housing sector, mitigate household energy cost increases in the medium term, foster a growing renewable energy and sustainable housing industry in Canada, increase consumer awareness and demand for sustainable housing, and support Canada's goal of reducing pollutant and GHG emissions. The development of the EQUILIBRIUM™ Housing initiative in Canada will also help to ensure Canada's inclusion in competitive international housing markets and our next generation of value added exports. Detailed information on the EQUILIBRIUM™ Housing Initiative and each of the projects is available on the CMHC web site [www.cmhc.ca/equilibriumhousing](http://www.cmhc.ca/equilibriumhousing).

**CMHC Project Officer :** Thomas Green

**CIDN :** 35490200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is available on the web

## SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

### SUPPORT FOR THE DEVELOPMENT OF A TECHNOLOGY ROADMAP (TRM) FOR SUSTAINABLE HOUSING IN CANADA

Canada Mortgage and Housing Corporation (CMHC), in partnership with Industry Canada (IC) and Natural Resources Canada (NRCan), will support the development of a Technology Roadmap (TRM) for Sustainable Housing. The TRM will be used to focus industry and government resources on realizing opportunities for, and addressing challenges to, sustainable housing. The TRM will be developed through industry consultations and the organization of industry working groups that will identify key areas of work and possible pathways forward.

**CMHC Project Officer :** *Duncan Hill*

**CIDN :** 37670200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUPPORT FOR THE GREENING OF THE CÔTEAU VERT PROJECT

This research project is documenting the development of a new green affordable housing development - Côteau Vert in Montreal, Quebec. The study provides information on the process that the development team took to assess, prioritize and ultimately select green products, equipment, systems and practices to be included in the buildings. This includes an analysis of the related costs, benefits and implementation/operational considerations. Quality assurance, commissioning and monitoring protocols were developed to support the implementation of the innovative features. This research project provides information for the residential construction industry on one development team's experience regarding the selection and implementation of green building features and technologies in the design of an affordable multi-unit residential building project.

**CMHC Project Officer :** *Woytek Kujawski*

**CIDN :** 37560200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SURVEY OF REGULATORY BARRIERS TO SUSTAINABLE HOUSING

This project will assess the extent of regulatory barriers faced by the first EQUilibrium™ design-build teams in the design and construction of their sustainable housing projects. This will provide CMHC with an opportunity to assess regulatory barriers to real, and very recent, sustainable housing projects. The outcome of this work will enable CMHC to better support the next generation of EQUilibrium™ housing and other sustainable housing efforts, contribute to improving residential building standards and construction practices, and support the federal government's environmental agenda.

**CMHC Project Officer :** *Douglas Rowland*

**CIDN :** 40220200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUSTAINABILITY INDICATORS FOR COMPUTER-BASED TOOLS IN COMMUNITY DESIGN

This External Research Project will evaluate sustainability indicators for potential integration with widely used geographic information system based modelling and visualization tools. It will refine the content and method of the indicators most suitable for such integration, propose new indicators where necessary, test refined and proposed indicators in a case study project and evaluate the results for broad application.

**CMHC Project Officer :** Mark Holzman

**CIDN :** 34380211

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUSTAINABLE BUILDING ENVELOPE RETROFITS FOR EXISTING HOUSES

This project produced fact sheets on energy and cost-effective strategies to improve the performance of the building envelopes of existing houses and increase awareness of the cost and environmental impacts of these improvements. The fact sheets include generic information about materials and components used in building envelopes, and detailed information about installation and connection of materials and components to ensure optimal performance. The fact sheets illustrate different strategies to improve walls, foundations, openings and penetrations and compare the estimated costs and energy savings of each. Best practice details illustrate and explain critical construction procedures and concerns. The fact sheets contain references to useful information and services, such as CMHC publications and the ecoENERGY program. They contain information about recycling and disposal of construction materials and their effects on the environment, and will increase the reader's awareness of the environmental impact of changes to their houses, and the ways to achieve the best energy efficiency and durability for the least expense.

**CMHC Project Officer :** Barry Craig

**CIDN :** 38340200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UNDERSTANDING THE SMART GROWTH GAP

This project will investigate the reasons for the gap between stated municipal policy objectives, which align with the goals of Smart Growth, and the results on the ground. It will aim to answer the following questions:

- What prevents the accomplishment of set goals?
- Are the goals inherently unachievable?
- What are the expected impacts of Smart Growth practices under a normal positive scenario?
- What time lines can be speculated or calculated for prescribed outcomes?
- What strategies are deemed most effective with respect to the level of impact?

The intent of this research is to enable local governments and industry to lay out a strategy that will produce sustained positive outcomes with predictable beneficial effects for the environment and for the well-being of community residents.

**CMHC Project Officer :** Mark Holzman

**CIDN :** 35230200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

### UPDATE NEIGHBOURHOOD COMPARISON WEB TOOL

This project will update an existing CMHC Web-based tool (<http://cmhc.ca/en/co/buho/sune/index.cfm>) that compares 6 neighbourhood types for key quality of life, environment and affordability variables in Canada's 5 largest metropolitan areas. The new project will update the census derived data with 2006 census results, since currently much of the data is based on the 2001 census. Two new variables will be added to the comparison: walkability and access to key commercial destinations.

**CMHC Project Officer :** Susan Fisher

**CIDN :** 39560200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UPDATE OF PRACTICES FOR SUSTAINABLE COMMUNITIES

This phased project will revise and update CMHC's publication, Practices for Sustainable Communities. The project will be carried out in two phases. Phase One will determine the appropriate revisions that will reflect current trends and best practices and address the needs and interest of municipalities and developers and builders, including determining the scope, organization and structure, content and format. The information resource will be updated in Phase Two.

**CMHC Project Officer :** Cynthia Rattle

**CIDN :** 39570200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### UPDATE OF SUSTAINABLE PLANNING AND DEVELOPMENT WORKSHOP FOR SMALL COMMUNITIES

This activity will update the content of the CMHC Sustainable Planning and Development Workshop for Small Communities which provides elected officials with knowledge and understanding of sustainable planning and development best practice information from the perspective of small communities thus promoting sustainable residential development.

**CMHC Project Officer :** Cynthia Rattle

**CIDN :** 41240200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## WATER CONSERVATION, REUSE & MANAGEMENT

### ALTERNATIVE WATER READY HOUSING

This project will help the adoption of alternative water systems in housing by providing information on how housing can be built to include provisions to accommodate the future installation of alternative water systems (e.g. rainwater, treated grey water) in an affordable manner. This will provide homeowners with an opportunity to improve the performance of their homes in a phased approach and will help build a broader market for innovative housing products.

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 40600200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## WATER CONSERVATION, REUSE & MANAGEMENT

### APPLICATION OF ONSITE WASTEWATER MANAGEMENT MODELS IN THE U.S. - LESSONS LEARNED FOR CANADA

This project will examine management models found within the EPA document "Voluntary National Guidelines for Management of On-site and Clustered (Decentralized) Wastewater Treatment Systems" and assess their feasibility for the Canadian context. This work will serve to inform Canadian regulatory stakeholders on how best to implement more rigorous management systems for both on-site residential wastewater management as well as small scale water reuse systems. This type of information is seen as critical to supporting the development of a robust decentralized water program within Canada.

**CMHC Project Officer :** Catherine Soroczan

**Division :** Policy and Research Division

**AVAILABILITY :** Product is available on the web

**CIDN :** 40590200

**STATUS :** Ongoing

**\*NEW\***

### ENERGY INTENSITY OF WATER SYSTEMS

This project will provide an increased understanding of the energy required to deliver water to and return wastewater from houses and housing developments. This, in turn, will help provide a more complete understanding of the energy consumption and green house gas (GHG) emissions associated with housing. Consideration of energy inputs into the water system would provide valuable information to water and wastewater agencies in assessing both upstream and downstream cost/benefits when scoping new water supply or treatment technologies as well as assessing the economics of alternative approaches.

**CMHC Project Officer :** Catherine Soroczan

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 40580200

**STATUS :** Ongoing

### EVALUATION OF WATER CONSERVATION PRACTICES

This research will provide municipalities with guidance in creating a cost effective water efficiency plan (WEP). The use of a standardized WEP will allow for practical and useful comparisons between water efficiency programs implemented across Canada. A template WEP will be developed to incorporate the variety of necessary parameters to be considered such as water source, population size and growth, regional socio-economic, climatic and geographic conditions, infrastructure status, target changes in water demands and wastewater flows, projected capital works and related costs, and cost/benefit. The WEP template will include a software database for creating a water efficiency plan plus a report documenting the key components of water efficient planning.

**CMHC Project Officer :** Catherine Soroczan

**Division :** Policy and Research Division

**AVAILABILITY :** Product is not yet available

**CIDN :** 30550200

**STATUS :** Ongoing



## WATER CONSERVATION, REUSE & MANAGEMENT

### NEXT GENERATION WATER BALANCE MODEL

CMHC has supported the development of the Water Balance Model - an on-line decision support tool to evaluate the impact of land use planning and site design on stormwater runoff and watershed health. This project will review the newly updated Water Balance Model tool and then field test it on the Don Valley Watershed in order to determine its effectiveness as a modelling tool, its reporting capabilities, and general ease-of-use. Separate work will be undertaken to incorporate a module to account for onsite water reuse.

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 38400200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### RAINWATER HARVESTING DESIGN MANUAL

Rainwater Harvesting (RWH) has been undertaken sporadically in Canada and has been recently allowed under some provincial codes. However, the lack of technical information on RWH is an impediment to wide scale adoption. Education and training on rainwater system design and installation practices are among the key issues to be addressed to help ensure rainwater harvesting systems are designed and installed properly and perform in a safe and effective manner in residential settings. Accordingly, this project will develop rainwater system design guide and training materials.

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 39810200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUPPORT FOR NATIONAL ON-SITE WASTEWATER RESEARCH PROGRAM

CMHC in conjunction with the Canadian Water and Wastewater Association and the provincial on-site associations of Ontario, Alberta, and B.C. will work with national stakeholders across the country to address research and policy gaps in the area of decentralized wastewater management. The network will identify and prioritize all research and policy issues, and leverage funding to address these issues and communicate the results across the country. As a starting point, CMHC will support targeted research for the development of on-site wastewater technology verification and installation standards. To date CMHC has supported the Bureau de normalisation du Québec (BNQ) in the development of a national standard for on-site wastewater technology verification. The CAN/BNQ 3680-2009 Onsite Residential Wastewater Treatment Technologies standard is now available through the BNQ website. A second initiative will support the development of a national on-site wastewater installation standard through the Canadian Standards Association.

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 35720200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is available



### SUPPORT FOR THE CREATION OF A NATIONAL WATER REUSE PROGRAM

CMHC will work with stakeholders from various government levels, associations, private industry and research centres to establish a Canadian national residential water reuse research and development program of work. This program will address gaps including: policy needs, risk analysis, design standards, pricing strategies, technology performance criteria, enhanced pilot testing and technology demonstration, national guidelines and regulations and innovative technology support for export to developed markets. The first project under this program has been the development of a draft national water reuse guideline for toilet application. In July 2010, Health Canada posted the guideline "Canadian Guidelines for Domestic Reclaimed Water for Use in Toilet and Urinal Flushing" on its website

[http://www.hc-sc.gc.ca/cwh-semt/pubs/water-eau/reclaimed\\_water-eaux\\_recyclees/index-eng.php](http://www.hc-sc.gc.ca/cwh-semt/pubs/water-eau/reclaimed_water-eaux_recyclees/index-eng.php)

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 35730200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### SUPPORT FOR THE CSA STANDARD FOR RESIDENTIAL POTABLE WATER CISTERNS

This project will strengthen national requirements for the safe provision of potable water to houses that use cisterns for potable water storage, including those located in First Nation and isolated rural communities. The project will also be of benefit to those seeking to design, build or renovate sustainable housing that does not rely on conventional water infrastructure.

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 40620200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### TESTING PROTOCOL FOR ALTERNATIVE RESIDENTIAL WASTEWATER TREATMENT

CMHC will work with the Canadian Standards Association (CSA) and partners from across Canada to develop a new standard for the evaluation of small scale water recycling, or reuse, systems. A rigorous technology verification standard will support the acceptance of water reuse by providing industry with a common standard with which to test their systems and demonstrate compliance. The standard will provide regulatory authorities with some assurance that compliant systems will perform and system designers with a performance reference when specifying alternative residential wastewater treatment systems.

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 39830200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## WATER CONSERVATION, REUSE & MANAGEMENT

### WETLAND WASTEWATER TREATMENT FOR ISOLATED DWELLINGS

This project will evaluate the performance of two wetland treatment systems in reducing wastewater contaminants from isolated dwellings including the effects of freeze thaw on operation and performance. A pilot hybrid wetland will be built at the Ontario Rural Wastewater Centre. The Centre has also built a pilot septage reed bed filter system in Eastern Ontario. The project will consider hydraulic and organic loading rates of septage and holding tank wastes and the impacts of the vegetation on treatment as well as climatic effects (precipitation, temperature).

**CMHC Project Officer :** Catherine Soroczan

**CIDN :** 38420200

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## WOMEN AND HOUSING

### ALL OUR SISTERS NATIONAL FORUM 2011

The All Our Sisters National Forum was the first Canadian forum specifically addressing security of housing, homelessness and safe communities for women. It focused on safe, sustainable, and affordable housing while considering three themes: recognizing barriers, best practices to create safe housing and safe communities, and moving forward by creating change. The conference aimed to increase the understanding of Canadian women's unique challenges in the housing continuum.

**CMHC Project Officer :** Sandra Baynes

**CIDN :** 43020202

**Division :** Policy and Research Division

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

### HOUSING DIFFICULTIES AND HOUSING PROGRAMS IN THE LIVES OF ABUSED WOMEN

This External Research Program project is examining the housing difficulties and experiences of women who have experienced different kinds of interpersonal violence (i.e., spousal, family, and landlord), and explore how their experiences vary as a function of the kind of violence.

**CMHC Project Officer :** Sandra Baynes

**CIDN :** 38840203

**Division :** External Research Program

**STATUS :** Ongoing

**AVAILABILITY :** Product is not yet available

## CMHC RESEARCH REPORT LISTINGS

To provide quick and comprehensive access to CMHC research published on a given topic, the Canadian Housing Information Centre compiles comprehensive listings of housing research produced over a number of years on certain topics. Topics chosen are those for which there is ongoing client interest and/or for which CMHC has published considerable research. To obtain an electronic, faxed or mailed copy of any of the lists below, contact the Canadian Housing Information Centre at: 1-800-668-2642 or e-mail us at: [chic@cmhc.gc.ca](mailto:chic@cmhc.gc.ca)

Listings available at this time include:

◆ Aboriginal Housing	◆ Acoustics
◆ Affordable Housing	◆ Airtightness
◆ Basements, Foundations and Crawl Spaces	◆ Concrete
◆ Condominiums	◆ Cooperative Housing
◆ Environmental Site Assessment and Contaminated Lands	◆ Healthy Housing
◆ Heating and Ventilation	◆ Homelessness
◆ Housing and Women	◆ Housing Export Opportunities
◆ Housing for Older Canadians	◆ Housing for Persons with Disabilities
◆ Indoor Air Pollution	◆ Infrastructure
◆ Lead	◆ Log Home Construction
◆ Manufactured Housing	◆ Moisture Problems
◆ Mortgages and Housing Finance	◆ Newcomers, Immigration & Settlement
◆ Northern Housing	◆ Rental Housing
◆ Residential Construction Waste	◆ Residential Renovation
◆ Self Help Housing	◆ Social Housing
◆ Straw Bale Housing	◆ Sustainable Development
◆ Water Conservation, Reuse and Management	

## ABOUT YOUR HOUSE SERIES

Fact sheets on common housing questions, issues and problems.

These documents are available in HTML and Adobe Acrobat format (pdf) on the CMHC web site at:  
[http://www.cmhc.ca/en/co/co\\_001.cfm](http://www.cmhc.ca/en/co/co_001.cfm)

Print copies can be obtained by calling 1-800-668-2642

Order no.	Series no.	Title
62027	CE 1	<b>Measuring Humidity in Your Home</b> Is there condensation on the windows? Are there wet stains on the walls or ceilings? Is there static or sparks whenever you touch something? Diagnose humidity problems in your home. Aussi disponible en français sous le titre : Mesurer l'humidité dans votre maison
62028	CE 2	<b>Combustion Gases in Your Home</b> Do you have a gas or oil fired furnace, boiler or water heater? What about a woodstove or fireplace? Take the necessary steps to keep combustion gases out of your home. Aussi disponible en français sous le titre : Les gaz de combustion dans votre maison
62029	CE 3	<b>Asbestos</b> What is asbestos? Why is it so useful? What problems can asbestos cause and what options does the homeowner have in dealing with them? Aussi disponible en français sous le titre : Amiante
62030	CE 4	<b>Hydronic Radiant Floor Heating</b> Heating option for homes. Tubes are placed in concrete floor with water running through. Popular in bathrooms and kitchen, and can be done for entire house - new or existing. Aussi disponible en français sous le titre : Système de chauffage à eau chaude par rayonnement à partir du sol
62031	CE 5A	<b>Understanding Window Terminology</b> This factsheet offers helpful guidance on buying the right type of window for your home. Terminology commonly used in the window industry is also presented. Aussi disponible en français sous le titre : Comprendre la terminologie des fenêtres
62032	CE 6	<b>Urea-Formaldehyde Foam Insulation (UFFI)</b> What is UFFI? Why was it banned? Should you be concerned about UFFI? How do you know if your home has UFFI? Aussi disponible en français sous le titre : Mousse isolante d'urée-formaldéhyde (MIUF)

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
60515	CE 7	<p><b>After the Flood</b></p> <p>Protect your health and prevent further damage to your home by following this step-by-step guide to restoring your home after a flood.</p> <p>Aussi disponible en français sous le titre : Après une inondation</p>
60516	CE 8	<p><b>Fighting Mold: The Homeowner's Guide</b></p> <p>Mold can cause allergies or respiratory disease. Learn how to identify and eliminate mold from your home.</p> <p>Aussi disponible en français sous le titre : Combattre la moisissure -- Guide pour les propriétaires-occupants</p>
62043	CE 9	<p><b>Maintaining Your HRV</b></p> <p>For a clean and healthy living environment, review the seven steps to maintaining the Heat Recovery Ventilator (HRV).</p> <p>Aussi disponible en français sous le titre : L'entretien du VRC</p>
60339	CE 10	<p><b>Wood Heat Safety in an Emergency</b></p> <p>Whether you often use a wood stove or a fireplace, or are coping with an emergency loss of electricity, learn how to safely use wood to heat your home.</p> <p>Aussi disponible en français sous le titre : Le chauffage au bois en toute sécurité lors d'une situation d'urgence</p>
60356	CE 11	<p><b>When You Must Leave Your House Due to Prolonged Winter Power Outage</b></p> <p>A series of practical tips to protect your home in case you are required to evacuate for more than 24 hours because of power failure.</p> <p>Aussi disponible en français sous le titre : Si vous devez quitter votre maison à cause d'une longue interruption de courant en hiver</p>
60360	CE 12	<p><b>Helping Your Trees Survive Storm Damage</b></p> <p>Practical pruning advice to restore the health and shape of trees damaged by ice or wind storms.</p> <p>Aussi disponible en français sous le titre : Soins à donner aux arbres endommagés par une tempête</p>
62034	CE 13	<p><b>Attic Venting, Attic Moisture, and Ice Dams</b></p> <p>How do you deal with a leak in the ceiling? How should an attic be properly vented? How do you eliminate ice dams? This fact sheet will answer these and other attic related questions.</p> <p>Aussi disponible en français sous le titre : Ventilation du vide sous toit, humidité dans le vide sous toit et formation de barrières de glace</p>



## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62035	CE 14	<p><b>Soot Staining on Carpets</b></p> <p>Does your carpet have permanent dark stains near baseboards, air registers or under doorways? Find out what causes carpet streaking and what you can do about it.</p> <p>Aussi disponible en français sous le titre : Taches en traînée sur les moquettes</p>
62036	CE 15	<p><b>Removing Ice on Roofs</b></p> <p>Whether you have a sloped or flat roof, learn techniques that will help you deal with extensive roof icing or ice dam problems.</p> <p>Aussi disponible en français sous le titre : L'enlèvement de la glace sur les toitures</p>
62037	CE 17	<p><b>The Importance of Bathroom and Kitchen Fans</b></p> <p>Choosing the proper kitchen and bathroom fans is important for improving indoor air quality and maintaining ideal humidity levels.</p> <p>Aussi disponible en français sous le titre : Importance des ventilateurs de cuisine et de salle de bains</p>
62038	CE 18	<p><b>How to Read a Material Safety Data Sheet (MSDS)</b></p> <p>Reading and understanding the Material Safety Data Sheet (MSDS) provides product information about product hazards and the necessary safety precautions to follow when using it.</p> <p>Aussi disponible en français sous le titre : Comment déchiffrer une fiche technique sur la sécurité des substances (FTSS)</p>
62039	CE 19	<p><b>Insulating Your House</b></p> <p>Choose the right insulation to reduce the amount of energy you use and to make your home more comfortable.</p> <p>Aussi disponible en français sous le titre : L'isolation de votre maison</p>
62040	CE 21	<p><b>Log Homes: Frequently Asked Questions</b></p> <p>A list of questions and answers concerning the unique design and building considerations for log homes.</p> <p>Aussi disponible en français sous le titre : Foire aux questions - maisons en rondins</p>
62041	CE 22	<p><b>Your Furnace Filter</b></p> <p>To reduce exposure to airborne particles, choose the furnace filter that best suits your needs.</p> <p>Aussi disponible en français sous le titre : Le filtre de votre générateur d'air chaud</p>



## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62042	CE 23	<p><b>Water-Saving Tips for Your Lawn and Garden</b></p> <p>Often water is applied inefficiently, resulting in significant waste due to over watering, evaporation or run-off. Here are some general watering tips to avoid such waste.</p> <p>Aussi disponible en français sous le titre : Comment entretenir vos pelouses et jardins en économisant l'eau</p>
60417	CE 24	<p><b>Backup Power for Your Home</b></p> <p>The top ten tips in choosing the appropriate backup system to provide electricity to your home in the event of a prolonged power failure.</p> <p>Aussi disponible en français sous le titre : Alimentation de secours pour votre maison</p>
62046	CE 25	<p><b>Carbon Monoxide</b></p> <p>A list of questions and answers dealing with keeping Carbon Monoxide out of your home and to help you choose the right CO detector.</p> <p>Aussi disponible en français sous le titre : Le monoxyde de carbone</p>
62277	CE 26a	<p><b>Hiring a Contractor</b></p> <p>How do you find the "right" contractor for you? What should go in a contract? What are liens, holdbacks and completion certificates? Make sure you get what you want and pay for when hiring a contractor.</p> <p>Aussi disponible en français sous le titre : Le Choix d'un entrepreneur</p>
62351	CE 26b	<p><b>Sample Renovation Contract</b></p> <p>A detailed written contract between you and the contractor you hire is essential to any renovation or home repair project, no matter its size.</p> <p>Aussi disponible en français sous le titre : Modèle de contrat de rénovation</p>
62045	CE 27	<p><b>Choosing a Dehumidifier</b></p> <p>Air that is too damp can cause condensation on windows, water damage to materials, mold and even wood rot. Choose the right dehumidifier to regulate the humidity in your home.</p> <p>Aussi disponible en français sous le titre : Le Choix d'un déshumidificateur</p>
	CE 28	<p><b>The Renovation Project (12 parts)</b></p> <p>This series will assist you in making informed decisions before you renovate. Each easy-to-read fact sheet helps you ask the key questions, reviews the available options and discusses the consequences if certain aspects of the renovation are overlooked.</p> <p>Advance planning is the key to successful renovations. These fact sheets help you plan, assess, and avoid surprises. Achieve the results you want by doing your renovation right the first time.</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62246	CE 28a	<p><b>Assessing the Renovation Project</b></p> <p>Before renovating, it's important to assess your home's current condition to determine if there are significant problems that you must deal with before or during the renovation project.</p> <p>Aussi disponible en français sous le titre : Évaluation des travaux de rénovation</p>
62248	CE 28b	<p><b>Renovating your Basement - Structural Issues and Soil Conditions</b></p> <p>Renovating a basement can add value and extra living space to a home. Fixing foundation problems before renovating is essential to preserve the durability and structure of the house.</p> <p>Aussi disponible en français sous le titre : Rénovation du sous-sol - Aspects structuraux et conditions du sol</p>
62250	CE 28c	<p><b>Renovating Your Basement - Moisture Problems</b></p> <p>Is there condensation on the basement windows? Are there white chalky stains on the foundation? Do the carpets smell musty? Creating a clean, dry and healthy living space is a critical first step.</p> <p>Aussi disponible en français sous le titre : Avant de rénover votre sous-sol - Problèmes d'humidité</p>
62252	CE 28d	<p><b>Renovating Your Kitchen</b></p> <p>The kitchen is often the most used room in the house and kitchen renovations typically have the highest financial payback. Conduct a pre-renovation inspection and prioritize the most desirable features for your new kitchen.</p> <p>Aussi disponible en français sous le titre : Avant de rénover votre cuisine</p>
62254	CE 28e	<p><b>Renovating Your Bathroom</b></p> <p>Bathroom renovations offer the second highest financial payback rate and are one of the most common home improvement projects. Use this fact sheet to check for problems before you renovate.</p> <p>Aussi disponible en français sous le titre : Rénovation de la salle de bains</p>
62256	CE 28f	<p><b>Window and Door Renovations</b></p> <p>Do you want more natural light in your living area? Are you concerned about security? Before repairing or replacing windows and doors, consider all of the factors outlined in this fact sheet.</p> <p>Aussi disponible en français sous le titre : Nouvelles portes et fenêtres</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62258	CE 28g	<p><b>Repairing or Replacing Roof Finishes</b></p> <p>Regular maintenance and periodic roof inspections will identify problems before they cause costly damage to your home. Learn about the key factors that will determine whether you should repair or replace your roof.</p> <p>Aussi disponible en français sous le titre : Avant de réparer ou remplacer le revêtement du toit</p>
62260	CE 28h	<p><b>Repairing and Replacing Materials - Exterior Walls</b></p> <p>Exterior finish materials must prevent rain and snow from penetrating the building and causing moisture damage. Repairing or replacing exterior wall finishes will protect and preserve the durability and structure of the home.</p> <p>Aussi disponible en français sous le titre : Avant de réparer ou remplacer des matériaux - les murs extérieurs</p>
62262	CE 28i	<p><b>Energy Efficient Retrofit - Mechanical Systems</b></p> <p>Upgrading the heating, cooling and ventilation (HVAC) equipment is the best way to create a healthy, comfortable and less expensive home to operate. Before altering these, it is important to understand how the overall performance of the house will be affected.</p> <p>Aussi disponible en français sous le titre : Avant d'améliorer l'efficacité énergétique de votre maison - installations mécaniques</p>
62264	CE 28j	<p><b>Energy Efficient Retrofit - The Building Envelope</b></p> <p>The envelope, or outer layer, of your house separates living space from the outdoor elements. Improving it can result in a better insulated, more airtight home that is easier to heat.</p> <p>Aussi disponible en français sous le titre : Améliorer l'efficacité énergétique - L'enveloppe du bâtiment</p>
62266	CE 28k	<p><b>Assessing the Comfort and Safety of Mechanical Systems</b></p> <p>The heating, ventilating and air conditioning (HVAC) systems are a vital part of your home. Ensure that your mechanical systems are operating safely and efficiently.</p> <p>Aussi disponible en français sous le titre : Évaluation de vos installations mécaniques - confort et sécurité</p>
62268	CE 28L	<p><b>A New Addition</b></p> <p>Before building an addition, clearly identify the features you need and inspect the current structure and mechanical systems to be sure they can support the new addition.</p> <p>Aussi disponible en français sous le titre : Avant de construire une annexe</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62044	CE 29	<p><b>Should you get your Heating Ducts Cleaned?</b></p> <p>Should you get your heating ducts cleaned? Will clean ducts result in improved air quality? When is duct cleaning most appropriate? This fact sheet separates fact from fiction.</p> <p>Aussi disponible en français sous le titre : Doit-on faire nettoyer les conduits de chauffage?</p>
63322	CE 30	<p><b>Water Damage, Mold and House Insurance</b></p> <p>You've had water damage in your house due to a burst pipe, a roof leak, or a heavy summer storm. You hope that your insurance will cover the damage. What to do?</p> <p>Aussi disponible en français sous le titre : Moisissure, dommages causés par l'eau et assurance habitation</p>
62226	CE 31	<p><b>Understanding and Dealing with Interactions Between Trees, Sensitive Clay Soils and Foundations</b></p> <p>Is the size, type or siting of a tree affecting your foundation? Understanding the interactions between trees, soils and the foundation can help you avoid foundation shifting, cracks and other damage.</p> <p>Aussi disponible en français sous le titre : Comprendre l'interaction des arbres, du sol d'argile sensible et des fondations et agir en conséquence</p>
65329	CE 32	<p><b>Setback Thermostats</b></p> <p>There are many claims about the energy savings due to setback thermostats. This document quantifies the savings but also describes houses or conditions where setback thermostats are not recommended.</p> <p>Aussi disponible en français sous le titre : Les thermostats programmables</p>
62288	CE 33	<p><b>CMHC Garbage Bag Airflow Test</b></p> <p>This simple test uses an ordinary garbage bag to help you estimate airflow from your furnace registers, bathroom exhaust fan or clothes dryer exhaust.</p> <p>Aussi disponible en français sous le titre : Essai de mesure du débit d'air à l'aide d'un sac à ordures</p>
62795	CE 34	<p><b>Your Septic System</b></p> <p>A primer on the components, operation and proper maintenance of an in-ground septic tank and system.</p> <p>Aussi disponible en français sous le titre : Votre installation d'assainissement</p>
62839	CE 35	<p><b>Hiring a Home Inspector</b></p> <p>One of the best ways to understand about a home's condition, habitability and safety is to hire a professional home inspector.</p> <p>Aussi disponible en français sous le titre : Le Choix d'un inspecteur en bâtiment</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62341	CE 36	<b>The Condominium Owners' Guide to Mold</b> Special advice for identifying and removing mold in a condo, and solving the problems that cause it. Aussi disponible en français sous le titre : Guide sur la moisissure à l'intention des copropriétaires
63902	CE 37	<b>The Tenant's Guide to Mold</b> This guide provides tenants of apartment buildings or rental houses with information to understand why mold grows and what they can do if they find mold growing in their unit. Aussi disponible en français sous le titre : Guide sur la moisissure à l'intention des locataires
64066	CE 38	<b>How to Reduce Chemical Contaminants in Your Home</b> This guide focuses on reducing exposure to chemical contaminants in the home, and will help you identify and avoid household products and materials which are sources of chemical contaminants. Aussi disponible en français sous le titre : Réduire les contaminants chimiques dans votre maison
62935	CE 39	<b>Buying a Toilet</b> Advice and tips on what to look for when buying a toilet. Aussi disponible en français sous le titre : L'achat de toilettes
63319	CE 40	<b>Buying a House with a Well and Septic System</b> Information on what to inspect and test if a property has a well and/or septic system. Includes checklists for potential buyers. Aussi disponible en français sous le titre : L'achat d'une maison avec un puits et une installation septique
62953	CE 41A	<b>UV Water Treatment</b> Describes the ultra-violet light water treatment process, and the pros and cons of using such a system. Aussi disponible en français sous le titre : Traitement de l'eau aux rayons ultraviolets (UV)
62898	CE 41B	<b>Water Distillers</b> Everything you ever wanted to know about water distillers from how they work to how to install and maintain them. Aussi disponible en français sous le titre : La distillation de l'eau



## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
62896	CE41C	<b>Water Filters</b> Consumer series of household water treatment options. Water filters are an inexpensive method of additional water treatment. Some filters can remove certain contaminants such as lead. Aussi disponible en français sous le titre : Filtres à eau
62946	CE 41D	<b>Water Softeners</b> Find out how a water softener works and obtain information on whether you should consider installing one. Aussi disponible en français sous le titre : Les adoucisseurs d'eau
62962	CE 41E	<b>Reverse Osmosis Water Treatment</b> Describes the reverse osmosis water treatment process, and provides the pros and cons of using such a system. Aussi disponible en français sous le titre : Filtration de l'eau par osmose inverse
62966	CE 42	<b>Canada's Construction System</b> The purpose of this document is to foster understanding of the elements of the system of construction and operation of buildings and houses in Canada. Aussi disponible en français sous le titre : Système de construction canadien
63890	CE 43	<b>Photovoltaics (PVs)</b> Consumer information piece presenting information on solar electric (photovoltaic) systems for housing Aussi disponible en français sous le titre : Les systèmes photovoltaïques
63134	CE 44	<b>Painting: Walls, Ceilings and Floors</b> This fact sheet provides general information on: selecting paints, e.g. latex (water based) or alkyd (oil based); types of paint and paint finishes, e.g. low or high sheen, sealer, primer, melamine; estimating quantity of paint required; preparing for painting; and painting tips. Aussi disponible en français sous le titre : La peinture : murs, plafonds et planchers.
63144	CE 45	<b>Flooring Choices</b> A quick summary of the advantages, considerations, installation, maintenance, and costs to think about when choosing resilient, laminate, and wood flooring, as well as carpet and ceramic tile. Aussi disponible en français sous le titre : Les revêtements de sol

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
63349	CE 46	<b>Fighting Asthma in Your House</b> Practical tips to help people with asthma improve the indoor air quality of their home. Aussi disponible en français sous le titre : Combattre l'asthme à la maison
63218	CE47	<b>Home Maintenance Schedule</b> This fact sheet provides a listing of the regular home maintenance tasks which should be done at various times throughout the year to protect the condition of your house. Aussi disponible en français sous le titre : Calendrier d'entretien de votre maison
63227	CE48	<b>Replacing Your Furnace</b> This fact sheet provides information for consumers who are replacing their existing furnace with a new one. It deals with fuel choice, furnace selection, and furnace sizing. Aussi disponible en français sous le titre : Le remplacement d'un générateur de chaleur
63235	CE 49	<b>Getting Your House Ready to Sell</b> Tips for homeowners who wish to get their house ready to sell. Aussi disponible en français sous le titre : Ce qu'il faut faire avant de mettre votre maison en vente
63436	CE50	<b>Avoiding Basement Flooding</b> Basement flooding leads to damage of the finishing material and possible growth of mold. This document reviews why basements flood and how to prevent floods from occurring. Aussi disponible en français sous le titre : Comment prévenir les inondations de sous-sol
63486	CE51	<b>Get to Know Your Soil</b> This fact sheet provides practical tips on how to analyse soil so that you can select the plants that are suited to the soil you have on your property. Once you have determined the soil conditions, it provides tips on how to amend it, if needed. Aussi disponible en français sous le titre : Apprenez à connaître votre sol
63488	CE52	<b>Low-Maintenance Lawns</b> Low-maintenance lawns help to reduce the time, costs, water, pesticides, fertilizer and energy used to maintain lawns. This fact sheet describes the benefits and provides practical tips on how to install and maintain low maintenance lawns, including species selection. Aussi disponible en français sous le titre : Les pelouses à faible entretien

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
63490	CE53	<p><b>Rain Gardens: Improve Stormwater Management in Your Yard</b></p> <p>Rain gardens are landscaped areas designed to receive stormwater and allow it to infiltrate into the soil. This fact sheet describes the benefits and provides practical tips on how to install and maintain gardens.</p> <p>Aussi disponible en français sous le titre : Un jardin pluvial pour mieux gérer les eaux de ruissellement dans votre cour</p>
63492	CE54	<p><b>Understanding Your New Home Sales Contract</b></p> <p>This fact sheet provides information on some of the terms and provisions that you may find in a new home sales agreement to illustrate what a contract can cover and an explanation why.</p> <p>Aussi disponible en français sous le titre : Comprendre le contrat de vente de votre maison neuve</p>
63495	CE55	<p><b>Selecting A New Home Builder</b></p> <p>This fact sheet provides information on how to find and what to look for and consider when searching for the right builder to build your new home.</p> <p>Aussi disponible en français sous le titre : Le choix d'un constructeur d'habitations</p>
63637	CE56	<p><b>Preventing Falls on Stairs</b></p> <p>This fact sheet tells you about some of the ways you can reduce the risk of falling on or from residential stairs.</p> <p>Aussi disponible en français sous le titre : Comment prévenir les chutes dans les escaliers</p>
63730	CE57	<p><b>Efficient, Convenient Wood Heating</b></p> <p>This is a short guide to the proper use of woodburning appliances in homes: what appliances to choose, how to operate them efficiently, what wood to burn, how to cut and store it, etc.</p> <p>Aussi disponible en français sous le titre : Le chauffage au bois pratique et efficace</p>
63683	CE58	<p><b>The ABC's of Windows</b></p> <p>This document will help consumers understand and select window performance levels with respect to airtightness, rain penetration and wind resistance appropriate for their climatic (and geographical) location and exposure conditions.</p> <p>Aussi disponible en français sous le titre : L'ABC des fenêtres</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
63911	CE59	<p><b>Should You Test the Air in Your Home for Mold?</b></p> <p>Testing the air in their home or apartment for mold is usually the first thing many people ask for when they suspect the presence of mold or have discovered mold growth. This fact sheet explains why air testing is not recommended, why an investigation by a trained professional is more useful and what to do if testing is deemed necessary.</p> <p>Aussi disponible en français sous le titre : Faut-il faire analyser l'air de la maison pour déceler la présence de moisissures?</p>
63822	CE60	<p><b>What to Do After a Fire</b></p> <p>Protect your health and prevent further damage to your home by following this detailed guide on the steps to restore your home after a fire.</p> <p>Aussi disponible en français sous le titre : Que faire après un incendie</p>
64092	CE61	<p><b>Renovating Your Basement for Livability</b></p> <p>This About Your House describes how renovating a full-height basement can be a relatively easy and cost-effective way to add new living space to your house.</p> <p>Aussi disponible en français sous le titre : Rénovation du sous-sol - objectif d'habitabilité</p>
64064	CE62	<p><b>Lead in Older Homes</b></p> <p>This About Your House describes where lead is found in older homes and who is at risk to lead exposure. It also describes procedures for testing lead in soil, water, paint, and dust.</p> <p>Aussi disponible en français sous le titre : Le plomb dans les vieilles maisons</p>
65023	CE63a	<p><b>Accessible Housing by Design - Ramps (Large Print)</b></p> <p>For anyone who needs to make their house accessible to someone who uses a wheelchair or other mobility device, this About Your House sheds light on the design and construction of ramps for the home. After reading this publication, you will understand how a ramp should be built, the materials that should be used and things to take into consideration before building a ramp for your home.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - Les rampes d'accès (à gros caractères)</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
65080	CE63b	<p><b>Accessible Housing by Design - Appliances (Large Print)</b></p> <p>The design of an appliance can make it very easy or very difficult to use. If you have a disability, limitations in an appliance's design can make it almost impossible to use. Using the principles of Universal Design, this About Your House will help you select an appliance by outlining important design considerations, making helpful suggestions and explaining the safety features of appliances.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception — les appareils (à gros caractères)</p>
65542	CE63c	<p><b>Accessible Housing by Design - Lifts &amp; Residential Elevators</b></p> <p>Residential lifts and elevators can benefit many people— particularly seniors who want to remain in their homes despite a loss of mobility, strength or agility. This About Your House tells you about the types of residential lifts and elevators that are commonly available in Canada. It also tells you about some of the things you should consider when you choose and install an elevator or lift in your home.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - élévateurs et ascenseurs résidentiels</p>
65544	CE63d	<p><b>Accessible Housing by Design - Residential Hoists and Ceiling Lifts</b></p> <p>A residential hoist or ceiling lift can help people who have difficulty safely moving themselves or others in or out of bed, or in or out of a bathtub. This About Your House tells you about the types of residential hoists and ceiling lifts that are commonly available in Canada. It also tells you about some of the issues you should consider when you choose and install a hoist or ceiling lift in a house, condominium or apartment.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - les lève-personnes résidentiels</p>
65588	CE63e	<p><b>Accessible Housing by Design - Kitchens</b></p> <p>A home designed and constructed to reflect the principles of Universal Design is safer and more accommodating to the diverse range of ages and abilities of people who live in and visit this home. This About Your House discusses the Universal Design kitchen, which considers efficient design, efficiency of effort, adaptability, ease of cleaning, audibility and safety in order to provide a comfortable and safe space for all family members.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - les cuisines</p>



## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
65686	CE63f	<p><b>Accessible Housing by Design: Bathrooms</b></p> <p>A bathroom designed and constructed according to the principles of universal design should be comfortable and safe for all family members, regardless of age or ability. This About Your House outlines the design considerations and elements of a universally designed bathroom, from manoeuvring space and ease of cleaning to grab bars and walk-in bathtubs and showers.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - salle de bains</p>
65889	CE63g	<p><b>Accessible Housing by Design: Home Automation</b></p> <p>The use of technology and automation in the home can help create living spaces that are convenient and energy efficient, that minimize the potential for accidents, and result in a house that is able to adapt to life's changes. Home automation provides many benefits to people with physical, sensory and mental disabilities, allowing them to live more independently. This AYH describes systems and devices that can control elements of your home environment : lighting, appliances, telephones, home security and mechanical, entry and safety systems . resulting in an environment that is more accommodating to everyone who lives there or visits, regardless of age or physical ability.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - Domotique</p>
66091	CE63h	<p><b>Accessible Housing by Design: Fire Safety for You and Your Home</b></p> <p>People with disabilities and seniors are more likely to be injured in a fire than the general population as they are often unable to evacuate independently and quickly, and are not prepared with a fire safety plan. This About Your House provides many quick and easy steps that you can take to prevent fires in your home and plan for fire and emergency situations and minimize accidents ensuring that your home occupants, especially people with disabilities and seniors family are safe.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - la sécurité-incendie pour assurer votre protection et celle de votre habitation</p>
66093	CE63i	<p><b>Accessible Housing by Design: House Designs and Floor Plans</b></p> <p>This fact sheet provides design guidelines for the most common types of accessible house designs including: visitable housing, adaptable and accessible housing and housing built using the concepts of universal design.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - types d'habitations et plans d'étages</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
66095	CE63j	<p><b>Accessible Housing by Design: Living Spaces</b></p> <p>This fact sheet provides an overview of planning and design guidelines to consider when creating, renovating or redecorating the living spaces in your home.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - les espaces habitables</p>
67572	CE63k	<p><b>Accessible Housing by Design: Exterior Spaces</b></p> <p>Learn how to successfully design a universally accessible exterior space by assessing the space and identifying how you, your family and friends will use it.</p> <p>Aussi disponible en français sous le titre : Une habitation accessible dès la conception - les espaces extérieurs</p>
66348	CE64	<p><b>How to Get the Ventilation That You Need in Your House</b></p> <p>This document provides a guide to using the ventilation systems in your house to provide adequate fresh air to residents.</p> <p>Aussi disponible en français sous le titre : Comment bien ventiler votre maison</p>
65009	CE65	<p><b>Garden Suites</b></p> <p>With municipal approval, a garden suite is a self-contained unit, set on relative's property with an existing single family house. This publication provides introductory information on garden suites for seniors or persons with disabilities.</p> <p>Aussi disponible en français sous le titre : Les pavillons-jardins</p>
65527	CE66A	<p><b>How to Lock Out Crime - Home Security 101</b></p> <p>This fact sheet walks you through an assesment of your home's current security; includes a checklist that can help you assess what needs to be improved.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile 101</p>
65529	CE66B	<p><b>How to Lock Out Crime - Home Security - Exterior</b></p> <p>This fact sheet gives you suggestions on how to improve security from the exterior of your home through lighting strategies and home visibility.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - L'extérieur</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
65531	CE66C	<p><b>How to Lock Out Crime - Home Security—Alarms</b></p> <p>This fact sheet gives you information to help you decide whether an installed burglar alarm is the right choice for you. Two types of systems are discussed, the perimeter alarm system and the area alarm system.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les avertisseurs</p>
65533	CE66D	<p><b>How to Lock Out Crime - Home Security - Doors</b></p> <p>This fact sheet suggests ways you can improve your door security.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les portes</p>
65535	CE66E	<p><b>How to Lock Out Crime - Home Security - Windows</b></p> <p>This fact sheet suggests ways to improve the security performance of your windows.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les fenêtres</p>
65537	CE66F	<p><b>How to Lock Out Crime - Home Security - Patio Doors</b></p> <p>This fact sheet suggests ways to improve the security of one of the favourite targets of burglars: patio doors.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les portes-fenêtres</p>
65539	CE66G	<p><b>How to Lock Out Crime: Home Security -- Common Sense</b></p> <p>Even if all the required bolts, hinges, latches and alarms have been installed, good home security cannot be achieved without first adopting the common-sense precautions outlined in this fact sheet.</p> <p>Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Une affaire de bon sens</p>
66343	CE67	<p><b>Attached Garages and Indoor Air Quality</b></p> <p>Attached garages, while convenient, can move vehicle-based pollutants into houses. The document shows how to avoid this source of pollution.</p> <p>Aussi disponible en français sous le titre : Les garages attenants et la qualité de l'air intérieur</p>
66497	CE68	<p><b>Secondary Suites</b></p> <p>Secondary suites can provide affordable living space and intensify urban development without adding new buildings. This article explains what the homeowner should consider before building or renovating a secondary suite.</p> <p>Aussi disponible en français sous le titre : Appartements accessoires</p>

## ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
65548	CE70	<p><b>Equilibrium: Healthy Housing for a Healthy Environment</b></p> <p>CMHC's Equilibrium housing initiative is a powerful new movement in sustainable housing. It can help homeowners reduce their energy bills, protect their families' health, reduce greenhouse gas emissions, and keep the environment clean for generations to come.</p> <p>Aussi disponible en français sous le titre : Equilibrium : maison saine pour un environnement sain</p>

## ABOUT YOUR APARTMENT SERIES

Order no.	Series no.	Title
63419	AE1	<p><b>Solving Odour Transfer Problems in Your Apartment</b></p> <p>One of the most common problems experienced by the occupants of apartment buildings is the transfer of objectionable odours from one apartment to another. Tobacco smoke and cooking odours top the list of complaints. This fact sheet explains how odours are transferred, and offers a number of potential solutions. Some are very easy to implement and others should be done with the agreement of the building management. Some are trial and error. Solving the problem can take perseverance.</p> <p>Aussi disponible en français sous le titre : Enrayez la transmission d'odeurs dans votre appartement</p>
63904	AE2	<p><b>Reducing Noise in Your Apartment</b></p> <p>This article provides basic information about the behaviour of sound and noise and suggests ways to improve the peace and tranquility in your apartment or condominium.</p> <p>Aussi disponible en français sous le titre : Atténuation du bruit dans votre appartement</p>
65013	AE3	<p><b>Dealing with Power Outages</b></p> <p>Lengthy power outages rarely occur in Canada, but when they do, they can affect your comfort and safety. This fact sheet, intended specifically for occupants of multi-unit residential buildings, will help you plan ahead for, and deal with, power outages in your apartment building. Topics include, amongst others, contents of an emergency kit, use of alternate power, and summer and winter power failures.</p> <p>Aussi disponible en français sous le titre : Les pannes de courant</p>
65050	AE4	<p><b>Fire Safety</b></p> <p>Each year, many Canadians are injured or die in house or apartment fires. This fact sheet, intended specifically for occupants of multi-unit residential buildings, offers practical fire prevention tips and important information regarding smoke alarms. It will also help you create an escape plan for you and your family, and instruct you on what to do should a fire occur in your apartment.</p> <p>Aussi disponible en français sous le titre : La sécurité-incendie</p>
65041	AE5	<p><b>Improving Your Security and Safety</b></p> <p>This About Your Apartment fact sheet, intended specifically for occupants of multi-unit residential buildings, provides practical advice on how to protect yourself, your family, and your belongings. It highlights the types of security and safety features you may have in your building and how to use them effectively. Topics include, amongst others, proper locks for windows and doors, neighbourhood security, preventing falls from windows and balconies, combustion safety, and carbon monoxide.</p> <p>Aussi disponible en français sous le titre : Pour une meilleure sécurité chez soi</p>



## ABOUT YOUR APARTMENT SERIES

Order no.	Series no.	Title
65297	AE6	<p><b>Dealing with Pests</b></p> <p>Most people can relate to the surprise, shock and revulsion of coming across pests in their homes. This fact sheet, intended specifically for occupants of multi-unit residential buildings, will help you prevent and reduce infestations in your apartment by describing how insects enter homes and what they need to survive. Topics include pest proofing your apartment, Integrated Pest Management (IPM), and health concerns associated with pests and pesticides.</p> <p>Aussi disponible en français sous le titre : La lutte contre les parasites</p>
66002	AE7	<p><b>The Tenant's Guide to Mold</b></p> <p>This fact sheet is intended for people living in rented apartments and offers practical information on mold problems beginning with an overview of mold and its causes, why it is a concern, and how to identify a mold problem and estimate its severity.</p> <p>Aussi disponible en français sous le titre : Guide sur la moisissure à l'intention des locataires</p>
65975	AE8	<p><b>Energy and Water Saving Tips for Your Apartment</b></p> <p>This fact sheet has energy- and water-saving tips that can save you money and make your apartment more comfortable. It lists things you can do yourself and things you can do in co-operation with your building's management.</p> <p>Aussi disponible en français sous le titre : Conseils pour économiser l'énergie et l'eau dans votre appartement</p>

## ABOUT YOUR HOUSE SERIES

### ABOUT YOUR HOUSE - NORTH SERIES

#### VOTRE MAISON - DOSSIER DU NORD

The North About Your House series is a series specifically designed around day to day northern solutions as well as innovative northern models of building practices which work under cold climate conditions. In this series you will find examples of how to use structural panels in the high arctic, means to cleanse wastewater in the North as well as demonstrated ways of constructing a roof which can withstand northern conditions and how to choose a foundation system which will work in any of the northern communities.

Order no.	Series no.	Title
62303	North Series 1	Building with Structural Panels -- Repulse Bay
62304	Dossier du Nord	Maison à panneaux isolants de construction à Repulse Bay
62295	North Series 2	On-site Wastewater Reclamation Systems for the North
62297	Dossier du Nord 2	Installations de recyclage sur place des eaux usées dans le nord
62329	North Series 3	Snowshoe Inn, Fort Providence Co-generation Model
62330	Dossier du Nord 3	Modèle de cogénération du Snowshoe Inn, Fort Providence
62298	North Series 4	Residential Foundation Systems for Permafrost Regions
62299	Dossier du Nord 4	Fondations pour les bâtiments résidentiels construits sur le pergélisol
62154	North Series 5	Eagle Lake Healthy House
62155	Dossier du Nord 5	La maison saine d'Eagle Lake
62313	North Series 6	Arctic Hot Roof Design
62314	Dossier du Nord 6	Conception de toits chauds pour climat arctique
63050	North Series 8	How to Prevent Plumbing and Heating Vent Stack Freeze-up
63051	Dossier du Nord 8	Prévenir le gel des colonnes de ventilation de plomberie et des conduits d'évacuation de l'appareil de chauffage
63394	North Series 9	Fancoil Integrated Combination Heat and Domestic Hot Water Systems
63395	Séries du Nord 9	Installation de chauffage des locaux et de l'eau intégrée à un ventilo-convecteur

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Brief descriptions of CMHC research papers you may wish to obtain. These research highlights are available in HTML and Adobe Acrobat format (pdf) on the CMHC web site at:

<http://www.cmhc-schl.gc.ca/publications/en/rh-pr/index.html>

Print copies can be obtained by calling **1-800-668-2642**

Order no.	Series no.	TITLE
67558	11-103	Earth Tube Ventilation Systems — Applicability in the Canadian Climate
67564	11-102	Testing Different Approaches to Energy Reduction in Five 1 1/2 Storey Post-War Houses
67548	11-101	Monitoring Performance of Retrofitting from Tank to Tankless Water Heaters
67314	11-100	The Impact of Gas Fireplace Operation on Winter Energy Consumption and House Temperatures
67085	10-102	Increasing Nunavut Housing Ventilation Rates with HRVs
67087	10-101	Don River Watershed Site Evaluation — Predicting Effectiveness of Stormwater Source Controls in Urban Watershed Revitalization
67067	10-100	Cold Climate Radon Mitigation
66702	09-112	Sloping Sand Filters for On-Site Wastewater Treatment
66608	09-111	Effectiveness of HEPA Vacuuming on Mold in Houses
66602	09-110	Evaluating the Feasibility and Developing Design Requirements and Tools for Large-scale Rainwater Harvesting in Ontario
66590	09-109	Ecologically Engineered Stormwater Management — Five Case Studies
66598	09-108	Assessment of Ecologically Engineered Stormwater Management
66569	09-107	Monitoring Results for the Factor 9 Home
66555	09-106	Effectiveness of Dehumidifiers in Controlling Moisture in Houses
66564	09-105	Understanding Vapour Permeance and Condensation in Wall Assemblies
66541	09-104	The Northern Sustainable House: An Innovative Design Process
66474	09-103	Canada at the 2007 Solar Decathlon Competition
66476	09-102	Code Requirements and Costs of Incorporating Accessory Apartments in Houses
66373	09-101	Seabird Island Monitoring
66333	09-100	Long Term Performance of Slab-on-Grade House Foundations in Regina, Saskatchewan

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
66135	08-107	Effect of Mesh and Bale Orientation on the Strength of Straw Bale Walls
66097	08-106	Analysis of Renewable Energy Potential in the Residential Sector through High-Resolution Building-Energy Simulation
66063	08-105	Fixing Houses with High Radon -A Canadian Demonstration
66060	08-104	Approaching Net-Zero Energy in Existing Housing
65961	08-103	Laboratory Depressurization Test for Residential Gas Appliances - Part 2
65916	08-102	Development and Assessment of Crawl Space Remediation Strategies
65830	08-101	Benchmarking Home Energy Savings from Energy-Efficient Lighting
65903	08-100	Assessment of Natural Ventilation for Canadian Residential Buildings
65861	07-124	Residential Solar Mass Wall Analysis for Canada
65843	07-123	Understanding Vapour Permeance and Condensation in Wall Assemblies
65828	07-122	Straw Bale Construction in Atlantic Canada
65834	07-120	The Effects of Programmable Fan Controllers on Ventilation, Air Distribution and Energy Use
65863	07-119	Monitored Thermal Performance of ICF Walls in MURBs
65891	07-118	Preserved Wood as a Potential Source of Arsenic and Fungi in the Foundation Walls of Homes
65684	07-117	Investigation of the Performance of Residential Electronic Filters in Actual Use
65680	07-116	Drainwater Heat Recovery Performance Testing at CCHT
65649	07-115	Whistle Bend Planning and Design Charrette
65546	07-114	Wind-Rain Relationships in Southwestern British Columbia
65322	07-113	Sustainable Northern Development Charrette in Yellowknife
65302	07-112	Research on Green Rooftops and Walls in Québec City
65417	07-111	Field Testing of Valved Soffit Vent Performance in Protecting Roof and Attic in Strong Winds
65378	07-110	Action Plan for Sustainable Practices - Implementation Strategies for the Residential and Business Sections in the Greater Toronto Area
65365	07-109	Testing Oil-fired Appliance Depressurization Spillage

# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
65352	07-108	Boiler Piping Study
65350	07-107	Southeast False Creek Integrated Design Process Workshops
65375	07-106	Evaluation of Water-Efficient Toilet Technologies to Carry Waste in Drainlines
65033	07-105	Performance Evaluation of Retrofitted Solid Masonry Exterior Walls
65421	07-104	High-Performance Stucco for Housing
65346	07-103	Economic Assessment of Residential Basement System Insulation Options
65295	07-102	The Effects of Reflective Interior Shades on Cooling Energy Consumption at the CCHT Research Facility
65336	07-101	A Discussion Paper: Indoor Air Quality Investigations of Houses used for Marijuana Grow Operations
65344	07-100	Relationship Between Moisture Content and Mechanical Properties of Gypsum Sheathing
65104	06-114	Old North End, Saint John, New Brunswick Community Planning and Housing Charrette
65187	06-113	Green Roofs: A Resource Manual for Municipal Policy Makers
65100	06-112	Arviat Community and Housing Design Charrette
65259	06-111	Validation of an Onsite Wastewater Risk Assessment Model
65257	06-110	Impact of Water Softeners on Septic Tanks - Field Evaluation Study
65092	06-109	Occupancy-based Classification System for Design and Construction of Residential Basements
65243	06-108	Field Assessment of a NuAir AIMS eKOCOMFORT™ Unit
65245	06-107	The eKOCOMFORT Field Assessment Program
65274	06-106	West Coast Green Roof Performance at BCIT's Green Roof Research Facility
65035	06-104	Household Environmental Monitoring - A Strategy to Help Homeowners Reduce Their Environmental Impact
64994	06-103	Identifying and Removing Pollutants from Heat Recovery Ventilators
65002	06-102	Evaluation of Air Leakage Control Measures to Compartmentalize Newly Constructed Suites in a High- Rise Residential Building
64934	06-101	Green Phoenix Integrated Design Charrette for Sustainable Affordable Housing



# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
64958	06-100	Performance Evaluation of the Almon Street Multi-Unit Residential Building
64942	05-120	Investigating Moisture in Seasonal Housing
64940	05-119	Energy and Water Consumption Load Profiles in Multi-Unit Residential Buildings
64911	05-117	Predicting Time to Fogging of Insulated Glass Units
64913	05-116	Nunavut Research 2003-2005
64908	05-115	Study of Poured-in Place Concrete Wall Assemblies in Coastal British Columbia
64855	05-114	Reduction of Airborne Particles in Houses with Occupants Having Respiratory Ailments
64904	05-113	Duct Leakage Tests in Small Diameter Ducting System
64853	05-112	Assessment of Suite Compartmentalization and Depressurization in New High-rise Residential Buildings
64806	05-111	Laboratory Depressurization Test for Residential Gas Appliances
64843	05-110	Remote Monitoring and Control of On-site Wastewater Treatment, Recycling, and Reuse Systems
63928	05-109	Initial Material Characterization of Straw Light Clay
63945	05-107	Fire Experience, Smoke Alarms and Sprinklers in Canadian Homes: CMHC Research to 2005
63669	05-106	"The Land We Live on is our Home" The 'Gameti Ko' Project Second Community-led Workshop
63876	05-105	Testing the Adhesion of Air-Barrier Membranes in Wall Assemblies
63848	05-104	Ice Damming Field Research
63836	05-103	Assessment of the Energy Performance of Two Gas Combo-Heating Systems
63838	05-102	Development of Micro-CHP Technology Assessment Capability at CCHT
63818	05-101	Effects of ECPM Furnace Motors on Electricity and Gas Use
63816	05-100	Effects of Thermostat Setting on Energy Consumption
63745	04-131	Water Reuse Standards and Verification Protocol
63741	04-130	Dry and Comfortable Floors in Existing Basements
63733	04-128	Dynamic Buffer Zone (DBZ) System Performance

# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
63728	04-127	Comparison of Under-Floor Insulation Systems
63726	04-126	Update of Roof Truss Designs with Nailing Schedules
63641	04-125	Residential Sources of Lead
63677	04-124	Summary of Research on Water Resistive Barriers
63675	04-123	Assessing the Impact of Thickness on the Performance of Stucco Cladding
63673	04-122	Comparison and Analysis of Provincial Builder and Renovator Industry Programs
63635	04-121	Field Testing of "Spillage-Resistant" Appliances
63465	04-119	Diagnosing Attic Performance by Snow- and Frost-Melt Patterns
63620	04-118	Performance of Sprayed Polyurethane Foam on Indoor Foundation Walls
63615	04-117	Analysis of Ventilation System Performance in New Ontario Houses
63612	04-116	Energy Needs and Availability in Housing
63571	04-115	Building Canada: Phase One
63555	04-114	Investigating Claims Against Home and Property Inspectors
63557	04-113	Installation Guide for Residential Wood I-Joist Floor Systems
63547	04-112	Canadian Home Inspectors and Building Officials National Initiative Phase II: Development of National Certification and Accreditation Models
63528	04-111	Characterizing the Condominium Population of the Greater Ottawa Area, 1969-2002
63540	04-110	Strategies for Reducing Building Energy Use Via Innovative Building Envelope Technologies
63511	04-109	Maximum Performance Testing of Popular Water-Efficient Toilet Models
63542	04-108	Garage Performance Testing
63503	04-107	Survey of In-Suite Space and Domestic Hot Water Heating Systems In Multi-Residential Buildings
63400	04-105	Field Testing of an Integrated Ventilation Space Conditioning System for Apartments
63413	04-104	Practical Measures for the Prevention of Basement Flooding Due to Municipal Sewer Surcharge

# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
63407	04-103	House Dust: A Useful Tool To Assess Microbial Contamination In Homes
63390	04-102	Calgary Integrated Design and Sustainable, Affordable Housing Charrette
63365	04-101	Residential Combustion Spillage Monitoring
63376	04-100	Improved Make-up Air Supply Techniques
63382	03-134	Safe Housing for Lightly Contaminated Lands
63370	03-133	Residential Combustion Venting Failure - A Systems Approach
63374	03-131	The Canadian Residential Duct and Chimney Survey
63326	03-129	Monitoring the Performance of a Retrofitted Preserved Wood Foundation
63333	03-128	Review of Hygrothermal Models for Building Envelope Retrofit Analysis
63328	03-127	Static and Dynamic Earthquake Testing of Rainscreen Stucco Systems for B.C. Residential Wood-Frame Construction
63339	03-125	Water Penetration Resistance of Windows - Study of Codes, Standards, Testing and Certification
63367	03-124	Water Penetration Resistance of Windows: Study of Manufacturing, Building Design, Installation and Maintenance Factors
63315	03-123	Integrated Community Solutions: Regina's Affordable, Sustainable Housing Design Charrette
63294	03-122	The Impact of Requiring HVAC System Design Submittal on System Performance
63280	03-121	Ventilation Systems for Multi-Unit Residential Buildings: Performance Requirements and Alternative Approaches
63243	03-119	Reduction of Air Intake Contamination in High-Rise Residential Buildings
63257	03-118	Investigation of a Ground-Source Heat Pump Retrofit to an Electrically Heated Multi-Family Building
63237	03-117	Influence of an Electronic Air Cleaner on Indoor Ozone
63225	03-116	Qualification of the Degree of Acoustic Comfort Provided by Multi-Family Buildings - Phase II
63233	03-115	Case Studies of Major Energy Retrofits
63208	03-114	Technology Roadmap for Intelligent Buildings

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
63223	03-113	Dawson City Demonstration Monitoring Northern Ventilation
63206	03-112	Guidelines for On-Site Measurement of Moisture in Wood Building Materials
63204	03-111	Comparison of Modeled and Monitored Performance of a Wall Insulation Retrofit in a Solid Masonry Building
63214	03-110	Integrated Design Charrette for a Sustainable UniverCity Community
63200	03-109	Proper Retrofit Furnace Sizing
63188	03-108	Re-Sale of Leaky Condos: Did the Buyer Know?
63194	03-107	Design of Durable Joints Between Windows and Walls
63192	03-106	Cooling Rates of Houses During Extended Power Failures
63190	03-105	Penetration of Outdoor Particles Into a Residence
63186	03-104	Indoor Particulate and Floor Cleaning
63182	03-103	Incompatible Building Materials
63175	03-102	Seville Theatre Redevelopment Project: Integrated Design Process
63172	03-101	Mandatory Home Inspections on Resale Homes in Ontario
63132	03-100	Rain Water Harvesting and Grey Water Reuse
63102	02-137	Multi-Residential High Efficiency Clothes Washer Pilot Project
63065	02-135	Monitored Performance of an Innovative Multi-Unit Residential Building
62637	02-133	Positive Pressure Ventilation for High-Rise Buildings
63035	02-132	Alternative Wall Systems for Low-Rise Housing
63053	02-130	Evaluation of Vapour Diffusion Ports on Drying of Wood-Frame Walls Under Controlled Conditions
63044	02-129	Investigation Protocol for Evaluation of Post-Tensioned Buildings
63019	02-128	"Northern Landscaping: A Guide to Restoring Plants and Soil in Northern Communities"
63015	02-127	LeBreton Flats District Heating System Performance Assessment
63017	02-125	Healthy Indoors: Achieving Healthy Indoor Environments in Canada
62995	02-124	Dual-Flush Toilet Testing
62997	02-123	Green Roof Infrastructure Workshop

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
63022	02-120	Study of High-Rise Envelope Performance in the Coastal Climate of British Columbia
62976	02-118	Compliance of Ventilation Systems Installed to Meet Proposed Changes to the 1995 NBCC
63104	02-117	Research Project on the Noise Produced by DWV Pipes Made of Cast Iron, PVC and ABS
62894	02-116	Wood Usage in Straw Bale House Construction
62892	02-115	Energy Use in Straw Bale Houses
62890	02-114	Defining the Convective Driving Force for Soil Gas Intrusion into Houses
63116	02-112	Community Energy Management – Foundation Paper
62881	02-109	Composite Masonry Wall Ties
62888	02-108	Noise Isolation Provided by Gypsum Board Partitions
62955	02-105	Achieving Healthy Indoor Environments: A Review of Canadian Options
62944	02-104	Technology Dissemination: Triggering Innovation Adoption in Canada's Home Construction Industry
62950	02-103	Moldy Houses: Why They Are and Why We Care & Additional Analysis of Wallaceburg Data: the Wallaceburg Health and Housing Studies
62968	02-102	Transforming Your Practice: Integrated Design Charrettes for Sustainable Buildings
62876	02-101	Healthy High-Rise: A Guide to Innovation in the Design and Construction of High-rise Residential Buildings
62960	02-100	Final Assessment of Conservation Co-op's Greywater System
62799	01-143	Independent 6 L Toilet Testing Program
62747	01-142	Analysis of the Annual Energy and Water Consumption of Apartment Buildings in the CMHC HiSTAR database
62745	01-141	The Sustainable Home Water System
62743	01-140	2001 Building Failures Study
62741	01-139	The Envelope Drying Rates Analysis Study
62739	01-138	Innovative On-Site Wastewater Treatment
62737	01-137	Evaluation of Urban Drainage for Basement Flood Proofing



## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
62735	01-136	Protection of Basements Against Flooding Trends and Impacts of Drainage Regulations
62731	01-134	Technical Impediments to Use of the Existing On-Site Sewage System of Host House to Service Garden Suite on Same Property
62729	01-133	Lower Cost Alternative for Municipal Sewer Inspection and Maintenance
62727	01-132	Assessment of the Takla Landing Contour Trench Wastewater Disposal System
62723	01-130	The Ontario Wall Drying Project Phase 2
62721	01-129	The Ontario Wall Drying Project (1991)
62715	01-126	Monitoring of Cavity Humidity Levels at Canada Life Building
62713	01-125	A Commissionable Air Barrier System for the Building Envelope
62709	01-123	Air Leakage Characteristics, Test Methods and Specifications for Large Buildings
62707	01-122	Air Infiltration from Attached Garages in Canadian Houses
62705	01-121	Canadian Municipal Water Conservation Initiatives
62701	01-119	The BREEAM Green Leaf Environmental Assessment Protocol for Multi-Residential Buildings
62699	01-118	Quality Assurance Protocol Test Drive by CMHC and Polygon Construction Management Ltd
62697	01-117	Stormwater Management Alternatives
62693	01-115	Commissioning Guide for the Toronto Healthy Houses Water Systems
62691	01-114	Peak-Day Irrigation Demand Reduction Monitoring
62689	01-113	Evaluating the Performance of On-Site Sewage Disposal Systems
62687	01-112	Advancing the "Light Grey Option": Making Residential Greywater Use Happen
62685	01-111	Estimation of the Contribution of Phosphorus From On-Site Sewage Disposal Systems to Lakes
62679	01-108	Domestic Cold Water Booster Pump Control Monitoring Pilot Program
62677	01-107	Impact of Added Insulation on Air Leakage Patterns
62675	01-106	Thermostat Settings in Houses with In-floor Heating

# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
62673	01-105	Case Study on Basement Renovations
62671	01-104	Monitoring the Performance of an EIFS Retrofit on a 15-Storey Apartment Building
62669	01-103	Energy Use Patterns in Off-Grid Houses
62667	01-102	"Plex" Housing: A Renewed Tradition
62665	01-101	Greenbacks from Green Roofs: Forging a New Industry in Canada
62663	01-100	WATERSAVE: Water Reclamation System Design Tool
62661	00-147	Investigation of Black Soot Staining in Houses
62659	00-146	Ten Steps to a Cooler Planet
62655	00-144	Retrofitting Ventilation Into Low-Rise Housing
62653	00-143	Low Temperature Heating
62651	00-142	Elastomeric Membrane Installations in Parking Garages (1992)
62647	00-140	Compendium of Research on the Conservation Co-op Building
62643	00-138	Performance of a Brick Veneer/Steel Stud Wall System
62635	00-134	The Renovation of an Apartment Building with Solid Masonry Walls
62633	00-133	Renovating Distinctive Homes: 1½ Storey Post-War Homes
62631	00-132	Moisture Properties of Plaster and Stucco for Straw Bale Buildings
62629	00-131	Canadian Home Inspectors & Building Officials National Initiative
62627	00-130	Airtightness of Concrete Basement Slabs
62625	00-129	Extent of Carbonation in Buildings in Toronto
62623	00-128	Parking Structure Deterioration: A Survey and Analysis of its Extent and Influencing Factors
62617	00-125	Deterioration of Parking Structures: Extent, Causes and Repair Considerations
62615	00-124	Cost-Effective Concrete Repair: Research, Investigation, Analysis, and Implementation
62613	00-123	Optimization of Impact Sound Insulation in Steel Frame Floors in Residential Buildings
62611	00-122	Study of the Noise Generated by Heat Pumps in Residential Areas
62607	00-120	Exterior Insulation and Finish Systems (EIFS): Problems, Causes and Solutions

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
62605	00-119	Measured Pressure Equalized Performance of an Exterior Insulation Finish System (EIFS) Specimen
62603	00-118	Performance Evaluation of Water Repellents for Above-Grade Masonry
62601	00-117	Mechanical and Electrical Systems in Apartments and Multi-Suite Buildings: A Practitioner's Handbook
62599	00-116	Voices for Safe Neighbourhoods: Awareness and Assessment Mean Action
62597	00-115	Building Envelope Rehabilitation Consultant Guide and Owner/Property Manager Guide
62595	00-114	Service Life of Multi-Unit Residential Building Elements and Equipment
62593	00-113	Determination of Water Vapour Diffusion Across Brick Masonry Treated With Water-Repellent Sealers
62591	00-112	Wall Moisture Problems in Alberta Dwellings
62589	00-111	Rigid Air Barrier Assemblies
62587	00-110	Review of OHC Building Energy and Water Audits
62585	00-109	Summary Report for Consortium on Fire Resistance and Sound Insulation of Floors: Sound Transmission Class and Impact Insulation Class Results
62579	00-106	Field Tests of Ventilation Systems Installed to Meet the 1993 OBC and 1995 NBC
62577	00-105	Sound Transmission Loss Measurements Through 190 mm and 140 mm Blocks With Added Drywall and Through Cavity Block Walls (1990)
62575	00-104	Corridor Air Ventilation System Energy Use in Multi-Unit Residential Buildings
62573	00-103	Straw Bale House Moisture Research
62571	00-102	Measured Pressure Equalized Performance of an Exterior Insulation Finish System (EIFS) Specimen
62569	00-101	Measured Pressure-Equalized Performance of a Brick Veneer/Steel Stud Assembly
62567	00-100	Measured Pressure-Equalized Performance of Two Precast Concrete Panels
N/A	99-124	Research Project on the Noise Insulation Provided by Exterior Walls in Wood Construction

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	99-123	Envelope Moisture Performance Through Infiltration, Exfiltration and Diffusion - EMPTIED
N/A	99-122	Fire Resistance Tests On Small-Scale Floor Assemblies
N/A	99-120	Residential Building Energy Estimation Method based on the Application of Artificial Intelligence
N/A	99-119	Practical Guidelines for Designers, Contractors, and Developers on the Installation of Air Leakage Control
N/A	99-118	Field Testing to Characterize Suite Ventilation in Recently Constructed Mid- and High-Rise Residential Buildings
N/A	99-117	Drying of Walls with Ventilated Stucco Cladding Parametric Analysis
N/A	99-116	Case Studies of Potential Applications of Innovative Residential Water and Wastewater Technologies
N/A	99-115	Water Quality Guideline and Water Monitoring Tools for Residential water reuse systems
N/A	99-114	On-Site Exterior Wall Monitoring Methods for Air Leakage, Condensation and Rain Penetration Control Problems
N/A	99-113	Development of Generic Engineered Details for the Construction of Residential Tall Walls
N/A	99-112	Qualification of the Degree of Acoustic Comfort in Multi-Family Buildings
N/A	99-111	Comparative Analysis of Residential Construction in Seattle, WA. and Vancouver BC
N/A	99-110	Research Project on the Reduction of Noise Produced by Garage Doors in Multiple Housing Projects
N/A	99-109	Basement Walls That Dry Quickly
N/A	99-108	The Effects of Improved Residential Filtration on Particle Exposure
N/A	99-107	Drying of Stucco-Clad Walls
N/A	99-106	Wind-Driven Rain Study for the Governor's Road Project
N/A	99-104	High-rise Apartment Repair Needs Assessment
N/A	99-103	Quality by Design: A Quality Assurance Protocol for Wood-Frame Building Envelopes in British Columbia
N/A	99-102	Costs and Benefits to Municipalities of Mandatory Residential Fire Sprinklers

# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	99-101	A Study of Recurring Mold Problems on the Roseau River Reserve, Manitoba
N/A	99-100	The Effect of Improving the Home Environment on Asthma: A Pilot Study
N/A	98-134	The Potential Application of Compartmenting Strategies in High-Rise Residential Buildings
N/A	98-132	Multiple Housing for Community Sustainability
N/A	98-130	Sound and Fire Performance of Fire Stops in Multi-Family Dwellings
N/A	98-127	Innovative Residential Water and Wastewater Management
N/A	98-126	Effectiveness of an Acoustic Continuous Monitoring System for Post-Tensioned Buildings - An Evaluation Report
N/A	98-125	Effectiveness of an Electromagnetic Wave Propagation Technique for the Condition Assessment of Unbonded Post-Tensioned Tendons: An Evaluation Report
N/A	98-123	Establishing the Protocol for Measuring Air Leakage and Air Flow Patterns in High-Rise Apartment Buildings
N/A	98-122	Field Investigation Survey of Airtightness, Air Movement and Indoor Air Quality in High-Rise Apartment Buildings-Prairie Region
N/A	98-121	Airtightness Tests on Components used to join different or similar materials of the building envelope
N/A	98-120	Noise Isolation Provided by Windows in Residential Projects
N/A	98-119	Protecting Gypsum Sheathing in Insulated Steel-Stud Walls
N/A	98-118	Exterior Insulated Finish Systems (EIFS) Field Performance Evaluation
N/A	98-117	The Influence of Unsteady Pressure Gradients on Compartmentalization Requirements for Pressure Equalized Rainscreens
N/A	98-116	Report on the CSA Questionnaire on Building Commissioning
N/A	98-115	Indoor Air Quality Test Protocol for Highrise Residential Buildings
N/A	98-114	Investigation of the Performance of Gypsum Sheathing
N/A	98-113	Ease Demonstration Project (APCHQ's Advanced House)
N/A	98-112	The Tire Impact Machine as a Standard Device for Rating the Impact Sound Transmission of Floors
N/A	98-111	Strength and Stiffness Characteristics of Steel Stud Backup Walls Designed to Support Brick Veneer



## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	98-110	Testing of Air Barrier Systems for Wood Frame Walls
N/A	98-109	Air Permeance of Building Materials
N/A	98-108	Results of Fire Resistance Tests on Full-Scale Insulated and Non-Insulated Gypsum Board Protected Wall Assemblies
N/A	98-107	Development of Design Procedures and Guidelines for Reducing Electric Demand by Air Leakage Control in High-Rise Residential Buildings
N/A	98-104	Vents, Ventilation Drying, and Pressure Moderation
N/A	98-103	An Application Guide for Water Reuse Systems
N/A	98-102	Survey of Building Envelope Failures in the Coastal Climate of British Columbia
N/A	98-101	Regulatory Barriers to On-Site Water Reuse
N/A	98-100	Field Investigation of Indoor Environment and Energy Usage of Mid-Rise Residential Buildings
N/A	97-121	Full Scale Tests of Brick Veneer Steel Stud Walls-Strength and Rain Penetration
N/A	97-119	Evaluation of Pollutant Source Strengths and Control Strategies in Innovative Residential High-Rise
N/A	97-117	Testing for Leaks in Furnace Heat Exchangers
N/A	97-116	Unvented Gas Fireplaces
N/A	97-113	Evaluation of Site-specific Risk Assessment for Contaminated Lands
N/A	97-112	The Potential for Water Efficiency Improvements in Multi-Family Residential Buildings in Canada
N/A	97-111	Residential Water Conservation: A Review of Products Processes and Practices
N/A	97-110	Energy Performance Contracting in Multi-Unit Residential Buildings
N/A	97-109	Energy Performance Contracting and the Residential Sector Technical Report
N/A	97-108	Evaluation of Physical Adaptations and Home Automation Features in Four Housing Units Located in Ville Saint-Laurent, Québec
N/A	97-107	Water Flow by Means of Capillary Action
N/A	97-106	Field Investigation into Airtightness, Air Movement and Quality of Inside Air in Medium-Sized Residential Buildings
N/A	97-105	Optimum Vent Locations for Partially Pressurized Rainscreens

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	97-104	Anti-carbonation Coatings for Use on Canadian Buildings
N/A	97-103	Controlling Stack Pressure in High-Rise Buildings by Compartmenting the Building
N/A	97-102	Assessment Repair Strategy for Existing Buildings Constructed with Masonry Veneer Steel Stud Walls
N/A	97-101	High-Rise Apartment Repair Needs Assessment
N/A	97-100	Energy Audits of High-Rise Residential Buildings
N/A	96-239	Renovation Strategies for Brick Veneer Steel Stud Construction
N/A	96-238	The Rainscreen Wall: A Commissioning Protocol
N/A	96-237	Testing Rainscreen Wall and Window Systems: The Cavity Excitation Method
N/A	96-236	Laboratory Investigation and Field Monitoring of Pressure-Equalized Rainscreen Walls
N/A	96-235	Commissioning and Monitoring the Building Envelope for Air Leakage
N/A	96-234	Expert System Feasibility Study
N/A	96-233	Review of Non-Destructive Test Methods for Assessing Strength, Serviceability and Deterioration in Buildings
N/A	96-232	Impact of Mandatory Sprinklering of Multi-Unit Residential Buildings
N/A	96-231	Air Barrier Details - I & II
N/A	96-230	Exterior Insulation Finish Systems - Laboratory Evaluation of Material and Joints
N/A	96-229	Degradation of Wood Stud Wall Sound Insulation by Electrical Outlets
N/A	96-228	Flanking Sound Transmission in Wood Framed Construction
N/A	96-226	Research Project on Plumbing Noise in Multi-Dwelling Buildings
N/A	96-225	Household Appliance Noise Reduction Through a Hambro Concrete Floor
N/A	96-224	Sound Transmission Through Floors
N/A	96-223	Household Appliance Noise in Multi-Unit Buildings
N/A	96-221	The Design of Mechanical and Electrical Systems in Multi-Unit Residential Buildings - An Advisory Document

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	96-220	Airtightness, Air Movement, and Indoor Air Quality in High Rise Buildings
N/A	96-219	Implications of Adopting the National Energy Code for Housing in Ontario
N/A	96-218	Optimizing Residential Forced-Air HVAC Systems
N/A	96-217	Analysis of the Hygrothermal Behaviour of Residential High-Rise Building Components
N/A	96-216	Income and Expense Data for Residential Properties
N/A	96-215	Field Survey of Heat Recovery Ventilation Systems
N/A	96-214	A Study of the Rainscreen Concept Applied to Cladding Systems on Wood Frame Walls
N/A	96-213	Simulation of Wind-Driven Rain and Wetting Patterns on Buildings
N/A	96-212	Results of Fire Resistance Tests on Small-Scale Insulated and Non-Insulated Gypsum Board Protected Wall Assemblies
N/A	96-211	Performance of Brick Veneer/Steel Stud Wall Systems Subject to Temperature, Air Pressure and Vapour Pressure Differentials
N/A	96-209	The Zero-Cavity and DPV Wall Project
N/A	96-208	An Exploratory Study of the Climatic Relationships Between Rain and Wind
N/A	96-207	A Study of Mean Pressure Gradients, Mean Cavity Pressures, and Resulting Residual Mean Pressures Across a Rainscreen for a Representative Building
N/A	96-206	Straw Bale Moisture Sensor Study
N/A	96-205	Energy Efficient Windows, Lighting & Human Health
N/A	96-203	Molds in Finished Basements
N/A	96-202	A Survey of Problem Homes of the Environmentally Hypersensitive
N/A	96-201	Housing Needs of the Environmentally Hypersensitive Socio-economic / Health Factors
N/A	96-200	Ventilation Systems for New and Existing Houses with Electric Baseboard Heating
N/A	95-211	Performance of Simplified Ventilation Systems
N/A	95-210	Energy Efficiency Technology Impacts - Appliances

## RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	95-207	Development of an Interior Dampproofing Strategy to Prevent Basement Wall Condensation During Curing
N/A	95-205	Duct Cleaning
N/A	95-204	Environmental Site Assessment Interpretation Guidelines
N/A	95-203	Field Tests of Remedial Measures for Houses Affected by Hazardous Lands
N/A	95-202	The Effects of Glass Doors on Masonry Fireplace Spillage and Surface Temperatures
N/A	95-201	Ventilation and Air Quality Testing in Electrically Heated Housing
N/A	95-200	Evaluation of the Cleanup of Lead Paint Dust in Houses
N/A	94-200	ISO 9000 and the Residential Construction Industry
N/A	93-220	Linear Infrastructure Renewal
N/A	93-218	Concrete Carbonation in Canadian Buildings
N/A	93-216	Cogeneration Systems in Multi-Unit Residential Structures
N/A	93-214	Moisture in Canadian Wood-Frame House Construction Problems, Research and Practise from 1975-1991
N/A	93-211	Access Doors as Sound Barriers in Multiple-Unit Buildings
N/A	93-210	Renovation Strategies for Brick Veneer/Steel Stud Construction Part I: Brick Ties
N/A	93-208	Stormwater Control to Prevent Basement Flooding
N/A	93-207	Carbonation in Canadian Buildings
N/A	93-206	Testing of Fresh Air Mixing Devices
N/A	93-205	Efficient and Effective Air Handling Devices
N/A	93-204	Energy and Power Needs and Availability in Housing
N/A	93-203	The Clean Air Guide: How to Identify and Correct Indoor Air Problems in Your Home
N/A	93-202	Soil Gases and Housing: A Guide for Municipalities
N/A	93-201	Attic Ventilation and Moisture
N/A	93-200	Testing of Canadian Sources for Lead Analysis
N/A	92-207	Energy Conservation Impact of the Residential Rehabilitation Assistance Program

# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	92-206	Lead Precautionary Measures
N/A	92-205	Evaluation Protocol for Site Toxicity
N/A	92-204	Evaluation Protocol for Site Toxicity
N/A	92-203	Effectiveness of Clean-up Techniques for Leaded Paint Dust
N/A	92-202	Advice on The Use of Chemical Strippers for Removing Leaded Paint
N/A	92-201	Study of Houses Affected By Hazardous Lands
N/A	92-200	Investigating, Diagnosing and Treating Your Damp Basement
N/A	91-206	Effectiveness of a Hard-Connected Duct as a Source of Ventilation and Make-Up Air
N/A	91-205	Air Tightness, Air Movement and Indoor Air Quality in Quebec High-Rise Apartment Buildings
N/A	91-204	Consumers' Need for a Renovation Advisory Service
N/A	91-203	Air Tightness, Air Movement and Indoor Air Quality in Atlantic Region High-Rise Apartment Buildings
N/A	91-202	Airtightness Testing of Air Barrier Connection Techniques
N/A	91-201	Structural Requirements for Air Barriers
N/A	90-248	Cathodic Protection in the Rehabilitation of Reinforced Concrete Parking Structures
N/A	90-247	Soundproofing Floors Phase 2: The Surface of the Floor
N/A	90-246	Soundproofing Floors Phase 1: The Underside of the Floor
N/A	90-243	Exploring Low-Pollution Design
N/A	90-242	The Development of Test Procedures for Masonry Wall Air Barriers
N/A	90-240	Wet-Sprayed Cellulose Insulation in Wood-Frame Construction
N/A	90-238	Costs and Benefits of Installing Fire Sprinklers in Houses
N/A	90-237	Costs and Benefits of Smoke Alarms
N/A	90-232	Air Tightness, Air Movement and Indoor Air Quality in British Columbia High-Rise Apartment Buildings
N/A	90-231	Investigation of Crawl Space Ventilation and Moisture Control Strategies for B.C. Houses
N/A	90-230	Construction Problems in Multi-Family Residential Buildings
N/A	90-229	Handbook of Prefabricated Construction Systems



# RESEARCH HIGHLIGHTS: TECHNICAL SERIES

Order no.	Series no.	TITLE
N/A	90-227	Design and Construction of Monocoque House
N/A	90-226	Domestic Hot Water Tanks as a Space Heating Appliance
N/A	90-225	Atlantic Canada Wood Framing Moisture Survey
N/A	90-223	Thermal Testing of Wall Sections in the Northwest Territories
N/A	90-221	That Nice Woodsy Smell
N/A	90-219	Technology Transfer and Innovation in the Canadian Residential Construction Industry
N/A	90-218	Reclaiming the Attic
N/A	90-217	Advances in Basement Technology
N/A	90-215	The Effectiveness of Low Cost Mechanical Ventilation Systems
N/A	90-213	Attic Moisture Survey
N/A	90-210	Survey of the Medical Impact on Environmentally Hypersensitive People of a Change in Habitat
N/A	90-209	Certified Exhaust Fans: Laboratory and Field Testing
N/A	90-208	Housing for the Environmentally Hypersensitive: A Survey and Examples of Clean-air Housing in Canada
N/A	90-205	Mechanical Systems in High-Rise Residential Buildings
N/A	90-112	Field Study of the Indoor Environment in Mobile Homes

## RESEARCH HIGHLIGHTS: SOCIO-ECONOMIC SERIES

Brief descriptions of CMHC research papers you may wish to obtain.

These research highlights are available in HTML and Adobe Acrobat format (pdf) on the CMHC web site at: <http://www.cmhc-schl.gc.ca/publications/en/rh-pr/index.html>

Print copies can be obtained by calling 1-800-668-2642

Order no.	Series no.	TITLE
67542	11-012	Housing Affordability and the Well Being of Children: Toward a Longitudinal Research Strategy
67506	11-011	Smart Technologies in Affordable Seniors Housing
67502	11-010	2006 Census Housing Series: Issue 15: Seniors in Collective Dwellings
67498	11-009	2006 Census Housing Series: Issue 14 — The Housing Conditions of Visible Minority Households
67512	11-008	Long-term Household Projections — 2011 Update
67455	11-007	2006 Census Housing Series: Issue 13 — On-Reserve Housing Conditions
67556	11-006	Social Housing Redevelopment and Regeneration in Canada: Eight Case Studies
67316	11-005	2006 Census Housing Series: Issue 12 — Housing Conditions of Households in Canada's Mid-sized Urban Centres (Census Agglomerations)
67272	11-004	Welcoming Home: Social Support as a Benefit of Congregate Living for Persons with Mental Illness
67275	11-003	Smart Grab Bars: A Potential Initiative to Encourage Bath Grab Bar Use in Community-Dwelling Older Adults
67239	11-002	How-to Information Gaps and Priorities for Developers and Builders for Sustainable Residential Developments
67232	11-001	2006 Census Housing Series: Issue 11 — Off-reserve Non-Status Indian Households: Housing Conditions and Core Housing Need
67163	10-022	Government-imposed Charges on New Housing in Canada (2009)
67201	10-021	2006 Census Housing Series: Issue 10 — The Housing Conditions of Canada's Seniors
67181	10-020	2001 Participation and Activity Limitation Survey: Issue 10 — Summary of the Housing Conditions of Canadians with Disabilities Aged 15 Years and Older who are Living in a Household in Core Housing Need
67186	10-019	2006 Census Housing Series: Issue 9 — Inuit Households in Canada

## RESEARCH HIGHLIGHTS: SOCIO-ECONOMIC SERIES

Order no.	Series no.	TITLE
66748	09-024	2006 Census Housing Series: Issue 6 — Off-reserve Status Indian Households: Housing Conditions and Core Housing Need
66640	09-023	Inventory and Assessment of Sustainable Community Best Practice Guides for the Canadian Housing Sector
66634	09-022	2006 Census Housing Series: Issue 5 — Canada's Census Metropolitan Areas (CMAs)
66611	09-021	Recycling Catholic Convents and Religious Institutional Buildings into Affordable and Alternative Housing: Three Case Studies
66642	09-020	Livable Lanes: A Study of Laneway Infill Housing in Vancouver and Other Growing B.C. Communities
66606	09-019	Extended Characterization of Individuals Experiencing Occasional and Persistent Core Housing Need (2002-2004)
66627	09-018	Transit-Oriented Development (TOD): Canadian Case Studies
66560	09-016	2006 Census Housing Series: Issue 4 — Growth in Household Incomes and Shelter Costs, 1991-2006
66539	09-015	PerthWorks — A Small Town Sustainable Neighbourhood Project
66553	09-014	2001 Participation and Activity Limitation Survey: Issue 1 — Profile of the Housing Conditions of Canadians Aged 15 Years and Older with a Mobility and/or an Agility Disability
66472	09-013	Impact of Economic Cycles on the Incidence of Core Housing Need in Canada
66464	09-012	Housing Persons With an Intellectual Disability in Intentional Communities: Identifying Relevant Physical and Governance Structures
66422	09-011	Preconditions Leading to Market Housing on Reserve
66418	09-010	Rivergreen Ecovillage Design Charrette, Saskatoon
66401	09-009	Government-imposed Charges On New Housing In Canada
66389	09-008	Affordability Challenges and Rental Market Dynamics in Small Nova Scotia Communities with Community College Campuses
66303	09-007	2001 Census Housing Series: Issue 14 Household Mobility and Core Housing Need
66383	09-006	2006 Census Housing Series Issue 3 — The Adequacy, Suitability, and Affordability of Canadian Housing, 1991 - 2006
66360	09-005	2006 Census Housing Series Issue 2: the Geography of Core Housing Need, 2001 - 2006

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65913	08-003	Impacts of the Aging of the Canadian Population on Housing and Communities
65901	08-002	The Dynamics of Housing Affordability
65933	08-001	Life Cycle Costing Tool for Community Infrastructure Planning
65836	07-022	2001 Census Housing Series Issue 11: Profile of the Housing Conditions of Persons with Disabilities
65682	07-018	Housing Situation and Needs of Recent Immigrants in Montreal, Toronto, and Vancouver

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65431	07-005	Case Study: A Geographic Information System (GIS) as a Tool for First Nations Housing Management, Planning and Safety
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64984	06-004	Issues, Impediments and Opportunities to Using Designated Land On-reserve for Affordable Housing
65006	06-003	Household Income, Net Worth and Housing Affordability in Canada
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64992	06-001	2001 Census Housing Series Issue 10: Aging, Residential Mobility and Housing Choices
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64906	05-035	Cost Effectiveness of Eviction Prevention Programs
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